Asian Nursing Research xxx (xxxx) xxx

Contents lists available at ScienceDirect

Asian Nursing Research

journal homepage: www.asian-nursingresearch.com

Research Article

The Sexual Risk Behaviors of Middle School Students According to School Nurse Placement Levels in Korea

Gyu Young Lee, Da Ye Lee*

Red Cross College of Nursing, Chung-Ang University, Seoul, South Korea

ARTICLE INFO

Article history:
Received 19 September 2019
Received in revised form
26 June 2020
Accepted 3 August 2020

Keywords:
adolescent
Korea
nurses
schools
sexual behavior

ABSTRACT

Purpose: This study aimed to provide basic data for the future development of school-based sexuality education and school nurse placement policies by examining the sexuality education experience in middle schools according to levels of school nurse placement and identifying factors influencing on adolescent sexual risk behaviors.

Methods: This study examined data from the 2018 14th Korean Youth Risk Behavior Survey. The raw data from 30,229 middle school students enrolled in 400 schools were analyzed using descriptive statistics, Chi-square test, independent *t* test, and complex sample logistic regression analysis.

Results: It is found that, in Korea, school nurse placement rates varied by region from 37.9% to 114.8%, resulting in different levels of sexuality and alcohol prevention education ($p < .001$). Sexuality and alcohol prevention education lowered the likelihood of sexual risk behaviors by 0.54 and 0.87 times, respectively. The experience of drinking alcohol increased a student's likelihood of committing sexual risk behaviors by 4.40 and 3.57 times, respectively, whereas the experience of using a drug increased the risk by 9.42 and 5.00 times, respectively. Personal factors (e.g., gender and academic achievement) and socioenvironmental factors (e.g., school type and perceived economic status) were also found to influence on the sexual risk behaviors of adolescents, although, not to the same degree as sexuality education or health risk behaviors.

Conclusion: To protect students' sex-related health equity, more elaborate support policies are needed to ensure adequate placement of school nurses able to provide professional sexuality and related health education.

Introduction

Curiosity about sex and sexual behaviors during adolescence is a natural growth process in terms of developmental characteristics. However, sexual risk behavior with adverse physical, psychological, and social consequences for adolescents can be problematic. In Korea, according to the 14th Korean Youth Risk Behavior Survey (KYRBS), a nationwide survey of 60,040 middle and high school students conducted in 2018, about 5.7% of all adolescents had experience of sexual intercourse. The average age of this experience was 13.6 years [1]. Sexual experiences at this age may have long-term effects on health and lead to a disruption in schooling [2], resulting in a variety of crises, including lost opportunities for learning skills and education.

According to the U.S. Centers for Disease Control and Prevention, the following are the "six risk behaviors" of adolescents: unexpected accidents or violent behavior, drinking alcohol or other substance abuse, smoking, unhealthy eating habits, lack of exercise, and sexual behaviors related to unwanted pregnancy or sexually transmitted infections. Control and reduction of such risk behaviors can thus offer concrete measures for alleviating modern society's health problems. The adolescent is especially influenced by the effects of sexual risk behaviors because adolescence is a period of forming self-concept and identity in which various physical, psychological, and social changes are experienced. This means that the sexual risk behaviors of adolescents are likely to expand into social and individual problems later in life [3].

To understand the sexual risk behaviors outlined above accurately and comprehensively, it is necessary to identify the factors

Gyu Young Lee: https://orcid.org/0000-0002-2929-7819; Da Ye Lee: https://orcid.org/0000-0003-2503-9836

* Correspondence to: Da Ye Lee, PhD, Red Cross College of Nursing, Chung-Ang University, 102-705, 84 Heukseok-ro, Dongjak-gu, Seoul, 06974, South Korea.
E-mail address: dayelees@gmail.com

https://doi.org/10.1016/j.anr.2020.08.001

Please cite this article as: Lee GY, Lee DY, The Sexual Risk Behaviors of Middle School Students According to School Nurse Placement Levels in Korea, Asian Nursing Research, https://doi.org/10.1016/j.anr.2020.08.001

that influence these behaviors and give more importance to intervention strategies for prevention and treatment [4,5]. Adolescent sexual risk behaviors are influenced by and affect various environmental factors, such as individual characteristics, peers, parents, and school. Given these multiple aspects, it is therefore desirable to encourage adolescents to form healthy sexual identities based on accurate knowledge, consciousness, and attitudes [5,6].

Previous studies reported that sexual behavior is more common in men than in women [7–9] and that lower academic performance is associated with more sexual behaviors [10]. Health behaviors such as smoking, drinking alcohol, and using drugs were shown to be related to sexual behaviors [8–13]. Adolescents' sexual risk behaviors are also strongly affected by social factors. Thus, it is difficult to regard such behaviors as merely an individual's "deviant" or "selective" behavior [5,6]. Some researchers suggested economic status as a factor that influences the experience of sexual intercourse [7,12,13], contrary to others [8,10].

Sexuality education at school is one of the most effective measures for reducing adolescents' sexual risk behaviors [4]. Considering that younger students are likely to acquire information about sex at school [14], sexuality education at school and the role of peers are very important factors in reducing adolescents' sexual risk behaviors [15]. The sexuality education received in adolescence improves students' knowledge of sexual information [15,16], contributes to the formation of a positive sexual attitude [15,16], and is effective for changing sexual risk behaviors [17]. The results of a meta-analysis of the effect of sexuality education on adolescents' sexual risk behaviors showed that sexuality education directly reduced their sexual risk behaviors contributing to a decrease in the number of sexual intercourse experiences, sexual partners, and pregnancies as well as to increase in contraceptive use [4,17,18].

Considering this effect of school-based sexuality education on adolescents, school nurses are in a very important position to take responsibility for issues related to students' health and guide educational and medical systems related to school health [19]. In Korea, with the recognition of the importance of health education required by current trends and the necessity of experts delivering educational programs, institutional modifications to school-based health education has been attempted. Since 2009, the Ministry of Education has encouraged schools to enable school nurses to provide health education to students during regular school hours [20]. In 2015, the Ministry of Education announced the "Sexuality Education Standard," which mandates 15 hours of health education per grade. As a result of these policy supports, the enforcement rate of health education in all schools has continuously improved from 43.0% in 2010 to 51.8% in 2015 [21]. This implies that the role of the school nurse has shifted from the primarily passive responsibility of responding to illnesses and emergency care to actively include prevention, treatment, and rehabilitation [22].

As school-based sexuality education is led by the school nurse, it is necessary to determine whether there is a difference in the sexuality education experience and sexual health problems according to the placement rate of school nurses. The researches that have been conducted on the sexual experiences of Korean adolescents distinguished boys and girls and only applied either male or female students as the participants [23,24], or when adolescents including middle and high school students were included, the data of high school students, which is a period of activation in sexual activities, caused a big influence on the outcome and caused a restrictive interpretation for the data of the middle school students. Accordingly, the research participants were limited depending on the purpose of the study [25–27].

In case when a study was conducted on the sexual behaviors of middle school students by using the data of KYRBS, which is a nationwide sample survey, the range of influential factors were limited to general characteristics such as personal characteristics, family characteristics, and school characteristics [13], or the focus was placed on mental characteristics such as stress and depression [9,28], or specific behavioral influence such as drinking alcohol or smoking [28–30]. There have only been a few studies that conducted research on sexual behaviors in early adolescence by focusing on the health risk behaviors with reports on how the sexual experiences in early adolescence leaves a close influence as well as whether there was any experience of school-based education about it.

Using the raw data from the 14th KYRBS (2018), this study aimed to provide basic data for the future development of school-based sexuality education and school nurse placement policies by identifying factors that influence adolescent sexual risk behaviors in middle schools according to levels of school nurse placement.

The purpose of this study was as follows:

1. Examine the placement rate of school nurses by region.
2. Identify the general characteristics of middle school students according to school nurse placement levels.
3. Compare the level of sexuality education among middle school students according to the placement rate of school nurses.
4. Compare sexual risk behaviors among middle school students according to the placement rate of school nurses.
5. Identify factors influencing sexual risk behaviors among middle school students according to the placement rate of school nurses.

Methods

Study design

This study was a secondary analysis that examined data from the Statistical Yearbook of Education (2018) published by the Korean Educational Statistics Service and the 14th KYRBS (2018) conducted by Korean Center for Disease Control and Prevention (KCDC). Data were downloaded from the respective organizations' homepages after consent was acquired.

Sample

The 14th KYRBS (2018) is an anonymous self-report on-line survey for Korean students from middle school first to high school third grades to investigate their health behaviors such as smoking, drinking alcohol, dietary habits, and physical activity. Under government permission, this survey has been hosted by the Ministry of Education, Ministry of Health and Welfare, and Korea Centers for Disease Control and Prevention each year since 2005. The target population was middle and high school students as of April, 2018; participating students were stratified (region, school), sample-distributed (middle and high school), and sample-extracted (class). The samples comprised 400 middle schools and 400 high schools, for a total of 62,823 middle and high school students enrolled in 800 schools; the final number of participants was 60,040 (95.6%) students. The specific inclusion and exclusion criteria for the KYRBS data collection were as follows:

[Inclusion criteria]

- Boy and girl students enrolled in domestic middle and high schools.
- Capable of understanding the study's purpose and providing self-report for the online questionnaire.

[Exclusion criteria]

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- Students enrolled in schools of under 50 total students or students enrolled in schools under scheduled closure or under long-term temporal closure.
- Students with long-term absence, special needs, or reading disability.

To consider the seriousness of the consequences of middle school students' sexual experiences, the time when the first experience of sexual intercourse often occurs, this study analyzed data from 30,220 middle school students enrolled in 400 schools.

Ethical considerations

The Chung-Ang University review board of the institution to which the author belongs waived the requirement for screening of this study (Approval no. 1041078-201902-HRBS-065-01). The KYRBS (KCDC) homepage was accessed on February 17, 2019, and a written oath and plan for data use for the "request for raw data" were submitted. This allowed us to download the file named "kyrbs2018," which contained raw data from the 14th KYRBS (2018). The Korean Educational Statistics Service homepage was accessed on February 20, 2019, and the "4-1 middle school summary" and "4-18 teachers by certification." Excel files were acquired by downloading the 2018 Education Statistics Annual Report, which is open to the public. Following the purpose of this study, these were subjected to secondary analysis by this author in March, 2019.

Instruments

Variables from the statistical yearbook of education (2018) data

To analyze the school nurse placement rate by region, data from the Statistical Yearbook of Education (2018) on the number of middle schools by region and on the number of teachers with a school nurse certification enrolled in each region's education office were used.

Variables from the 14th KYRBS (2018) data

The 14th KYRBS (2018) items were determined by each division's advisory committee based on various domestic and foreign sources; the items, comprising 103 items and 16 categories, addressed smoking, drinking alcohol, physical activity, dietary habits, obesity, weight control, mental health, safety awareness, oral health, personal hygiene, sexual behavior, atopy, asthma, drug use, internet addiction, health equity, and violence. The variables used in this study were as follows:

Variables related to sexual risk behaviors

Variables related to sexual risk behaviors included experience of sexual intercourse, age of first sexual intercourse, sexual intercourse after drinking, method of contraception (oral contraceptive, condom, withdrawal ejaculation, rhythm method, postcoital contraception, and intrauterine device), and experience of pregnancy.

Variables related to health risk behaviors

Variables related to health risk behaviors included experiences of drinking alcohol and current rate of alcohol consumption (drinking more than a cup of alcohol), befuddlement (the result of drinking alcohol), smoking tobacco, smoking an electronic cigarette, and using a drug.

Variables related to sexuality education

Variables related to sexuality education included experiences of sexuality education programs, smoking prevention education programs, and alcohol prevention education programs.

Sociodemographic variables

Gender (male and female), school (boys' school, girls' school, and coeducational), grade (first, second, and third), parents' educational level (graduated middle school, graduated high school, above associate and bachelor's degree, and do not know), economic status (high, middle-high, middle, middle-low, and low), health (five-point scale, very healthy, and very unhealthy), and academic performance (high, middle-high, middle, middle-low, and low) were included. The economic status, health, and academic performances were recategorized as high, middle, and low and were analyzed.

Analysis

Considering the effect of the complex sample design, the data were analyzed using the SPSS AMOS 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to examine school nurse placement rate, experience of sexuality education, and the middle school students' general demographic characteristics. Chi-square tests and independent t tests were used to compare the middle school students' general characteristics, experience of sexuality education, and sexual risk behaviors according to school nurse placement rate. Complex sample logistic regression analysis was then performed to determine the factors that influence the students' sexual risk behaviors.

Results

Placement rate by region

According to the school nurse placement rates of middle schools in 17 provinces nationwide, seven municipalities satisfied the regulation requiring the placement of at least one school nurse per school, including the Seoul and Busan metropolitan areas (see Table 1). In the case of the Jeollanam-do, where the ratio was the lowest, only 94 schools of 248 had school nurses, resulting in a placement rate of 37.9%. The eight regions with the higher placement rates had one or more school nurse(s) per school, or placement rates of 97.7−114.8%, and these regions were categorized as the above-mean group. However, the values of the nine regions with the lowest nurse placement rates ranged from 37.9% to 74.6%, and they were indexed as the below-mean group. The results of the school nurse placement rates by regions showed great regional differences.

Comparison of general characteristics according to school nurse placement rate

A balanced gender distribution was achieved for the total number of middle school students surveyed: 15,328 (50.7%) men and 14,901 (49.3%) women. However, considering the level of school nurse placement, there were more female students (n = 9352 or 50.7%) than male (n = 9111 or 49.3%) in the above-mean group; but, in the below-mean group, there were more male students (n = 6217 or 52.8%) than female (n = 5549 or 47.2%), which made the difference between the two groups in terms of gender distribution significant (χ^2 = 35.04, p < .001). As for "perceived household economic status," almost as many students responded "intermediate" in both the above-mean group (n = 15,618 or 84.6%) and the below-mean group (n = 10,160 or 86.4%). However, the proportions of the response "high" were 13.9% and 11.9%, respectively, making the difference between the two groups significant (χ^2 = 27.38, p < .001).

Regarding "perception of one's own health status," almost as many students responded "normal" in both the above-mean group (n = 14,212 or 77.0%) and the below-mean group (n = 8934 or

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Table 1 *Regional Placement Rates of School Nurses and Adolescents' Experiences of Sexuality Education for Middle Schools in the Year of 2018 in Korea.*

Regions	No. of school nurses	No. of schools	Placement rates of school nurses (%)	Experiences of sexuality intervention			χ^2 (p)
				Total n (%)	Yes n (%)	No n (%)	
Seoul	442	385	114.8	4189 (100.0)	3561 (85.0)	628 (15.0)	143.05 (<.001)
Busan	189	174	108.6	1920 (100.0)	1679 (87.4)	241 (12.6)	
Gwangju	97	90	107.7	1198 (100.0)	1024 (85.5)	174 (14.5)	
Gyeonggi	673	627	107.3	6728 (100.0)	5671 (84.3)	1057 (15.7)	
Daegu	134	125	107.2	1472 (100.0)	1300 (88.3)	172 (11.7)	
Sejong	23	23	100.0	513 (100.0)	418 (81.5)	95 (18.5)	
Incheon	133	134	99.2	1758 (100.0)	1504 (85.6)	254 (14.4)	
Jeju	44	45	97.7	685 (100.0)	587 (85.7)	98 (14.3)	
Ulsan	47	63	74.6	982 (100.0)	862 (87.8)	120 (12.2)	
Daejeon	62	88	70.4	1139 (100.0)	1008 (88.5)	131 (11.5)	
Chungcheongbuk-do	76	127	59.8	1214 (100.0)	1001 (82.5)	213 (17.5)	
Gangwon	88	163	53.9	1170 (100.0)	918 (78.5)	252 (21.5)	
Chungcheongnam-do	96	187	51.3	1241 (100.0)	1001 (80.7)	240 (19.3)	
Gyeongsangbuk-do	132	262	50.3	1553 (100.0)	1316 (84.7)	237 (15.3)	
Gyeongsangnam-do	128	264	48.4	1914 (100.0)	1660 (86.7)	254 (13.3)	
Jeollabuk-do	98	209	46.8	1237 (100.0)	994 (80.4)	243 (19.6)	
Jeollanam-do	94	248	37.9	1316 (100.0)	1071 (81.4)	245 (18.6)	
Total	2556	3214	79.5	30,229 (100.0)	25,575 (84.6)	4654 (15.4)	

75.9%), and there was no significant difference between the two groups. For "academic achievement," the students in the above-mean group (n = 8309 or 45.4%) were more likely to perceive their own grades as "high" compared to those in the below-mean group (n = 4905 or 41.7%) (χ^2 = 57.09, p < .001; see Table 2).

Comparison of sexuality education experience according to school nurse placement rate

There was a significant difference in middle school students' experience of sexuality education according to the placement rate of school nurses (see Table 3). The proportion of students who had experienced sexuality education was significantly higher in the above-mean group (n = 15,744 or 85.3%) than in the below-mean group (n = 9831 or 83.6%) (χ^2 = 16.30, p < .001). The proportion of students who had experience of alcohol prevention education was significantly higher in the above-mean group (n = 9354 or 63.1%) than in the below-mean group (n = 5469 or 46.5%; χ^2 = 51.29, p < .001). The proportion of students who had experience of smoking prevention education was higher in the below-mean group (n = 9401 or 79.9%) than in the above-mean group (n = 14,650, or 79.3%); however, the difference was not significant (χ^2 = 51.29, p < .001).

Comparison of health risk behaviors according to school nurse placement rate

Among the health risk behaviors directly related to sexual risk behaviors, experiences of drinking alcohol, befuddlement, and using a drug showed the greatest difference according to school nurse placement rate (see Table 3). The proportion of middle school students who had experience of drinking alcohol was significantly higher in the below-mean group (n = 3506 or 29.8%) than in the above-mean group (n = 5037 or 27.3%; χ^2 = 22.44, p < .001). However, the proportion of students who had experienced "befuddlement" was higher in the above-mean group (n = 236 or 16.2%) than in the below-mean group (n = 132 or 13.0%; χ^2 = 5.00, p = .025). The proportion of students who had used a drug was also significantly higher in the above-mean group (n = 190 or 1.0%) than in the below-mean group (n = 91 or 0.8%; χ^2 = 5.10, p = .024).

Comparison of sexual risk behaviors according to school nurse placement rate

The proportion of students who had experienced sexual intercourse was 2.5% in both the above-mean and below-mean groups (see Table 4). The most common age for first sexual intercourse was between seventh and ninth grades (n = 370 or 55.5%) and showed no difference according to school nurse placement rate (χ^2 = 3.25, p = .220). Among those who had experienced sexual intercourse, 117 students (23.6%) engaged in the behavior after drinking alcohol. There were no differences in sexual risk behaviors, contraception, and experience of pregnancy according to school nurse placement rate.

Factors influencing sexual risk behaviors according to school nurse placement rate

Table 5 shows the results of the complex sample logistic regression analysis that was performed to determine what factors influenced sexual risk behaviors among students according to differences in school nurse placement rates. Experience of sexuality education lowered the likelihood of committing sexual risk behaviors by 0.54 times in both the above-mean group [95% confidence interval (CI), 0.43–0.67] and the below-mean group (95% CI, 0.40–0.72). Experience of alcohol prevention education lowered the likelihood of committing sexual risk behaviors by 0.87 times in the below-mean group (95% CI, 0.66–1.13).

Meanwhile, the experience of drinking alcohol increased the likelihood of committing sexual risk behaviors by 4.40 times (95% CI, 3.66–5.27) in the above-mean group and 3.57 times (95% CI, 2.75–4.61) in the below-mean group. Experience of befuddlement increased the likelihood of committing sexual risk behaviors by 3.99 times (95% CI, 2.78–5.70) in the above-mean group and 4.68 times (95% CI, 2.70–8.09) in the below-mean group. The experience of using a drug increased the likelihood of committing sexual risk behaviors by 9.42 times (95% CI, 5.22–16.97) in the above-mean group and 5.00 times (95% CI, 1.65–15.07) in the below-mean group.

The general factors found to affect sexual risk behaviors among middle school students were gender, perceived economic status, and academic achievement. Female students' likelihood of committing sexual risk behaviors was lower than males' by 0.57 times (95% CI, 0.46–0.70) and 0.37 times (95% CI, 0.25–0.54) in the

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Table 2 *General Characteristics of Participants According to School Nurse Placement Rates (N = 30,229).*

Variables	Categories	Total *n* (%)	Placement rates of school nurses		χ^2 (*p*)
			Above-mean[a] *n* (%)	Below-mean[b] *n* (%)	
Gender	Men	15,328 (50.7)	9111 (49.3)	6217 (52.8)	35.04 (<.001)
	Women	14,901 (49.3)	9352 (50.7)	5549 (47.2)	
Types of schools	Coeducation school	22,299 (73.8)	14,606 (79.1)	7693 (65.4)	730.31 (<.001)
	Boy's school	3991 (13.2)	1821 (9.9)	2170 (18.4)	
	Girl's school	3939 (13.0)	2036 (11.0)	1903 (16.2)	
Grades	Seventh grade	9847 (32.6)	6013 (32.6)	3834 (32.6)	0.38 (.826)
	Eighth grade	10,092 (33.4)	6186 (33.5)	3906 (33.2)	
	Ninth grade	10,290 (34.0)	6264 (33.9)	4026 (34.2)	
Father's education level	Graduated middle school	365 (1.2)	198 (1.1)	167 (1.4)	295.64 (<.001)
	Graduated high school	6011 (19.9)	3261 (17.7)	2750 (23.4)	
	Above associate & bachelor's degree	15,503 (51.3)	10,172 (55.1)	5331 (45.3)	
	The participant does not know	7168 (23.7)	4159 (22.2)	3009 (25.6)	
	N/A	1181 (3.9)	673 (3.3)	508 (4.3)	
Mother's education level	Graduated middle school	298 (1.0)	165 (0.9)	133 (1.1)	248.30 (<.001)
	Graduated high school	6870 (22.7)	3869 (21.0)	3001 (25.5)	
	Above associate & bachelor's degree	15,193 (50.3)	9932 (53.8)	5261 (44.7)	
	The participant does not know	6843 (22.6)	3958 (21.4)	2882 (24.5)	
	N/A	1024 (3.4)	539 (2.9)	485 (4.1)	
Perceived economic status	High	3957 (13.1)	2561 (13.9)	1396 (11.9)	27.38 (<.001)
	Average	25,778 (85.3)	15,618 (84.6)	10,160 (86.4)	
	Low	494 (1.6)	284 (1.5)	210 (1.8)	
Perceived health status	High	23,146 (76.6)	14,212 (77.0)	8934 (75.9)	5.43 (.066)
	Average	5784 (19.1)	3455 (18.7)	2329 (19.8)	
	Low	1299 (4.3)	796 (4.3)	503 (4.3)	
Academic achievement	High	13,295 (44.0)	8390 (45.4)	4905 (41.7)	57.09 (<.001)
	Average	8532 (28.2)	5202 (28.2)	3330 (28.3)	
	Low	8402 (27.8)	4871 (26.4)	3531 (30.0)	

[a] The above-mean group : the eight regions with the higher school nurse placement rates (Seoul, Busan, Gwangju, Gyeonggi, Daegu, Sejong, Incheon, and Jeju).
[b] The below-mean group : the eight regions with the lower school nurse placement rates (Ulsan, Daejeon, Chungcheongbuk-do, Gangwon, Chungcheongnam-do, Gyeongsangbuk-do, Gyeongsangnam-do, Jeollabuk-do, and Jeollanam-do).

above-mean and below-mean groups, respectively. Students who perceived their economic status as “average” were 0.49 times (95% CI, 0.39–0.61) and 0.53 times (95% CI, 0.37–0.74) less likely to commit sexual risk behaviors than those who perceived their economic status as “high” in the above-mean and below-mean groups, respectively. Students who responded that their academic achievement was “low” in the higher-ranking group were 1.42 times (95% CI, 1.14–1.76) more likely to commit sexual risk behaviors than those who responded that their achievement was “high.”

Discussion

Sexual experiences at early age of puberty may have long-term effects on health [2]. Considering this seriousness, sexuality intervention is more important for early adolescents in middle school as they enter puberty, because they face physiological maturity of the reproductive system during this period and begin to explore and design their own lives [15,17,20]. As school-based sexuality education is led by the school nurse, this study examined the placement rate of school nurses by region and identified factors influencing sexual risk behaviors among middle school students according to the placement rate of school nurses.

In accordance with the Enforcement Decree of the School Health Act in Korea, at least one school nurse should be placed per school; however, the results of this study showed that there was a large difference in placement rates depending on the region. Accordingly, the regions were divided into two groups with eight regions satisfying the requirement of one school nurse per school (the above-mean group) and nine regions not satisfying the requirement (the below-mean group).

In addition, the results of the logistic regression analysis performed showed that adolescents' sexual risk behaviors are influenced by various factors including students' experiences with sexuality education, alcohol prevention education, alcohol consumption, befuddlement, and drug use as well as by their gender, school type, and family economic status of family. These influencing factors showed a significant difference in odds ratio according to the school nurse placement rate. This result can be aligned with the ecological systems theory, there is not one specific factor that influences adolescents’ sexual risk behaviors; students are exposed to increasing risk factors (e.g., the extension of his peer network, the quality of parent monitoring), which are making their sexual behaviors more active, and influenced by important contextual factors at the family, peer network, community, and larger societal levels [5].

The results of this study showed that drinking alcohol and drug use had a substantial effect on sexual risk behaviors, which is consistent with the findings that substance-related health behaviors such as alcohol and drug use increase adolescents’ sexual behaviors [8,11,13,28]. According to the results of a recent study analyzing the factors affecting adolescents' sexual intercourse experiences using KYRBS data since 2014, it was found that sexual intercourse experiences increased by 1.5–1.7 times in the case of alcohol use and 4.0 times in the case of drug use [9,13,28]. This suggests a very strong association between health risk behaviors and sexual intercourse experiences. In the case of drug use, in particular, the predictive value of sex-related behaviors is significantly higher than that of health risk behaviors such as smoking tobacco or drinking alcohol [13], making the development of preventive interventions for these behaviors an urgent need. Therefore, the prevention of sexual risk behaviors in adolescents requires prevention of other health risk behaviors, such as drinking alcohol and using behavior-affecting drugs [31].

In addition to the importance of experiencing health prevention programs, the results of this study showed that students in both the above-mean and below-mean groups who had experience of sexuality education were 0.54 times less likely to commit sexual

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Table 3 *Experiences of Sex-Related Education and Health Risk Behaviors among Middle School Students According to School Nurse Placement Rates (N = 30,229).*

Variables	Categories	Total *n* (%)	Placement rates of school nurses		χ^2 (*p*)
			Above-mean *n* (%)	Below-mean *n* (%)	
Sexuality education	No	4654 (15.4)	2719 (14.7)	1935 (16.4)	16.30 (<.001)
	Yes	25,575 (84.6)	15,744 (85.3)	9831 (83.6)	
Alcohol prevention education	No	15,406 (51.0)	9109 (49.3)	6297 (40.9)	50.29 (<.001)
	Yes	14,823 (49.0)	9354 (63.1)	5469 (46.5)	
Smoking prevention education	No	6178 (20.4)	3813 (20.7)	2365 (20.1)	1.34 (.246)
	Yes	24,051 (79.6)	14,650 (79.3)	9401 (79.9)	
Experiences of drinking alcohol	No	21,686 (71.7)	13,426 (72.7)	8260 (70.2)	22.44 (<.001)
	Yes	8543 (28.3)	5037 (27.3)	3506 (29.8)	
Experiences of drinking alcohol within 30 days	No	6070 (71.1)	3582 (71.1)	2488 (71.0)	0.02 (.881)
	Yes	2473 (28.9)	1455 (28.9)	1018 (29.0)	
Experiences of befuddlement	No	2105 (85.1)	1219 (83.8)	886 (87.0)	5.00 (.025)
	Yes	368 (14.9)	236 (16.2)	132 (13.0)	
Experiences of smoking tobacco	No	27,670 (91.5)	16,927 (91.7)	10,743 (91.3)	1.30 (.253)
	Yes	2559 (8.5)	1536 (8.3)	1023 (8.7)	
Experiences of smoking electronic cigarette	No	29,161 (96.5)	17,810 (96.5)	11,351 (96.5)	0.01 (.965)
	Yes	1068 (3.5)	653 (3.5)	415 (3.5)	
Experiences of using a drug	No	29,948 (99.1)	18,273 (99.0)	11,675 (99.2)	5.10 (.024)
	Yes	281 (0.9)	190 (1.0)	91 (0.8)	

risk behaviors than those who had no sexuality education. Many studies have specifically stated that the importance and impact of school-based sexuality education should not be overlooked; school is the most important place to approach early adolescents, the period during which sexual values and relationships are established [4,14,15]. The need for effective school-based sexuality education is more prominent among middle school students because the development period of this age is characterized by strong curiosity about sexuality [15,17]. In the case of adolescents in their early teens, the place where the most information about sexual behaviors is obtained is the school [14]; moreover, sexuality education enhances adolescents' sexual knowledge and prevents sexual risk behaviors by helping students to develop positive attitudes toward sexual behaviors [15–17].

At this point, school nurses are able to contribute to enhancing the effectiveness of education by using their medical and health care professional expertise in school-based sexuality or related health education [31]. This study showed that the placement of school nurses makes a difference in terms of the availability of health education for students, including sexuality and related education such as alcohol and drug prevention. These results, therefore, suggested that the role of the school nurse is very important for delivering professional knowledge that improves students' sexual health, counseling sexuality and sexual problems in addition to providing health services [19]. To prevent such sexual risk behaviors, it is necessary to support school system policies and human resources as well as the individual efforts of school nurses.

Personal factors (e.g., gender and academic achievement) and socioenvironmental factors (e.g., school type and perceived economic status) were also found to influence the sexual risk behaviors of adolescents [7–13], although, not to the same degree as sexuality education or health risk behaviors. This finding suggests that there is an increasing need for individualized sexuality education. The results of this study also showed that female students were less likely to engage in sexual risk behaviors than male students, and students attending girls' school were less likely to engage in sexual risk behaviors than those attending coeducational schools. These findings are consistent with results of a study identifying gender differences in middle school students' gender knowledge, sources of information, sexuality problem-solving methods, sexual anxiety, purity (virginity) consciousness, perceptions of masturbation, perceptions of gender discrimination, and reasons for wanting sexuality education; and they are consistent with the results of previous studies on the sexual awareness and sexual experiences of middle

Table 4 *Sexual Risk Behaviors Among Middle School Students According to School Nurse Placement Rate (N = 30,229).*

Variables	Categories	Total *n* (%)	Placement rates of school nurses		χ^2 (*p*)
			Above-mean *n* (%)	Below-mean *n* (%)	
Experiences of sexual relations	No	29,480 (97.5)	18,006 (97.5)	11,474 (97.5)	0.01 (.972)
	Yes	749 (2.5)	457 (2.5)	292 (2.5)	
Age of the first sexual relation	Before fourth grade	228 (34.2)	137 (34.2)	91 (342)	3.25 (.220)
	Fifth to sixth grade	69 (10.0)	35 (8.7)	34 (12.8)	
	Seventh to ninth grade	370 (55.5)	229 (57.1)	141 (53.0)	
Experiences of sexual relations after drinking alcohol	No	572 (76.4)	345 (75.5)	227 (77.7)	0.49 (.480)
	Yes	117 (23.6)	112 (24.5)	65 (22.3)	
Experiences of birth control	Always	325 (43.4)	202 (44.2)	123 (42.1)	2.67 (.269)
	A few times	91 (12.1)	61 (13.3)	30 (10.3)	
	Never	333 (44.5)	194 (42.5)	139 (47.6)	
Means of birth control	Oral contraception	66 (15.9)	41 (15.6)	25 (16.3)	0.77 (.979)
	Condom	285 (68.5)	179 (68.1)	106 (69.3)	
	Coitus interruptus	44 (10.6)	29 (11.0)	15 (9.8)	
	Natural birth control	11 (2.6)	8 (3.0)	3 (2.0)	
	Emergency oral contraceptives	8 (1.9)	5 (1.9)	3 (2.0)	
	Intrauterine device	2 (0.5)	1 (0.4)	1 (0.7)	
Experience of pregnancy	No	186 (84.5)	124 (82.7)	62 (88.6)	1.27 (.259)
	Yes	34 (15.5)	26 (17.3)	8 (11.4)	

Please cite this article as: Lee GY, Lee DY, The Sexual Risk Behaviors of Middle School Students According to School Nurse Placement Levels in Korea, Asian Nursing Research, https://doi.org/10.1016/j.anr.2020.08.001

Table 5 *Factors Influencing Sexual Risk Behaviors Among Middle School Students According to School Nurse Placement Rate (N = 30,229).*

Classifications	Variables	Categories	Entire group			p	Placement rates of school nurses Above-mean			p	Placement rates of school nurses Below-mean			p
			Odds ratio	95% Confidence interval			Odds ratio	95% Confidence interval			Odds ratio	95% Confidence interval		
				Lower boundary	Upper boundary			Lower boundary	Upper boundary			Lower boundary	Upper boundary	
Sex-related education	Sexuality education	No	1				1				1			
		Yes	0.54	0.45	0.64	<.001	0.53	0.43	0.67	<.001	0.53	0.40	0.72	<.001
	Alcohol prevention education	No	1				1				1			
		Yes	1.03	0.86	1.16	.973	1.06	0.88	1.28	.479	0.86	0.66	1.13	.026
Health risk behaviors	Experiences of drinking alcohol	No	1				1				1			
		Yes	3.14	2.68	3.68	<.001	4.39	3.66	5.27	<.001	3.57	2.75	4.61	<.001
	Experiences of befuddlement	No	1				1				1			
		Yes	6.85	5.24	8.96	<.001	3.98	2.78	5.70	<.001	4.67	2.70	8.09	<.001
	Experiences of using a drug	No	1				1				1			
		Yes	10.04	7.38	13.64	<.001	9.41	5.22	16.97	<.001	5.00	1.65	15.07	.004
General characteristics	Gender	Male	1				1				1			
		Female	0.52	0.43	0.62	<.001	0.57	0.46	0.70	<.001	0.37	0.25	0.54	<.001
	Types of schools	Coeducation school	1				1				1			
		Boy's school	1.20	0.99	1.46	.052	1.12	0.76	1.47	.390	1.33	0.99	1.79	.051
		Girl's school	0.56	0.39	0.80	.002	0.46	0.28	0.75	.002	0.89	0.50	1.59	.707
	Education level of father	Graduate middle school	1				1				1			
		Graduate high school	0.57	0.36	0.92	.023	0.95	0.26	3.51	.946	1.18	0.21	6.65	.848
		Above associate & bachelor's degree	0.46	0.29	0.75	.002	0.96	0.26	3.60	.962	0.80	0.13	4.70	.809
		Do not know	0.37	0.22	0.62	<.001	0.89	0.22	3.57	.874	0.88	0.13	5.66	.899
		N/A	1.01	0.61	1.68	.945	1.13	0.28	4.47	.858	1.36	0.20	9.20	.750
	Education level of mother	Graduate middle school	1				1				1			
		Graduate high school	0.45	0.27	0.74	.008	0.42	0.12	1.44	.171	1.73	0.15	19.00	.654
		Above associate & bachelor's degree	0.44	0.26	0.73	.002	0.49	0.14	1.68	.260	0.92	0.08	10.41	.951
		Do not know	0.38	0.22	0.66	.001	0.36	0.10	1.36	.134	1.10	0.09	13.25	.936
		N/A	1.32	0.77	2.26	.302	0.94	0.26	3.42	.933	2.51	0.20	30.35	.468
	Perceived economic status	High	1				1				1			
		Average	0.50	0.41	0.60	<.001	0.49	0.39	0.61	<.001	0.52	0.37	.74	<.001
		Low	1.80	1.27	2.56	.001	1.67	1.07	2.59	.022	2.14	1.18	3.86	.011
	Academic achievement	High	1				1				1			
		Average	0.87	0.72	1.06	.184	0.82	0.64	1.05	.120	0.96	0.69	1.33	.833
		Low	1.23	1.03	1.48	.019	1.42	1.14	1.76	<.001	0.94	0.68	1.30	.743

school students according to gender [7,9,12,13,28]. In Asian countries, female students are less interested in sexuality and have lower acceptance of and openness to sexual desire than male students, and it could be influenced by a strong adherence to traditional Confucian gender norms [32]. This result suggests that the necessity of taking preventive interventions when considering these differences between male and female students' perceptions of sexuality. The results of this study also showed that academic achievement level is a factor in sexual intercourse experiences in the higher placement ranking group and that students with lower academic achievement are more likely to have sexual intercourse experiences, which is consistent with the results of previous studies [7] showing that low academic achievement is related to adolescents' sexual risk behaviors and delinquency.

Social factors, such as the family's economic status, as well as students' personal factors can also influence sexual risk behaviors. The results of this study showed that students who responded "high" or "low" economic status were more likely to have engaged in sexual risk behaviors than those who responded "intermediate," which is consistent with the results of previous studies [13]. Other studies, however, showed that higher economic status is related to sexual impulsiveness and problematic behaviors in adolescents [7] and that social and economic status are not related to adolescents' sexual risk behaviors [8,10].

All these factors influencing middle school students' sexual risk behaviors vary according to the school nurse placement rate. From the result, middle school students of the above-mean group had a higher likelihood that health risk behaviors such as alcohol and drug use are related to sexual risk behaviors than did those of the below-mean group. In addition, the differences in the influence of detailed requirements such as gender, school level, academic level, and economic status on middle school students' sexual risk behaviors were larger in the above-mean group than in the below-mean group. This may be due to environmental and contextual differences, as the above-mean group is composed of eight regions in metropolitan areas such as Seoul, Busan, Gwangju, and Gyeonggi Province, whereas the below-mean group is composed of nine regions in rural areas, including small towns. In studies of the differences in the rate of sexual intercourse between regions, it is reported that there was a significant difference between urban and rural areas [33,34], not reflecting the results of this study. Considering that domestic studies on regional comparisons of adolescents' sexual risk behaviors have been limited, as the most recent study were either performed at last 10 years ago, it is necessary to systematically investigate the effect of the differences between urban and rural areas on early adolescents' sexual risk behaviors according to environmental changes.

The results of this study, consequentially, showed that the presence of school nurses affects students' health education experiences, including sexuality education and alcohol prevention education. This means that students are not given equal learning opportunities for health education and, as a result, the best opportunity to provide the biggest help for helping prevent students' sexual risk behaviors is missed. Considering all these aspects, it seems that school nurses are able to help impart accurate sexuality knowledge and develop appropriate sexual values and attitudes among students by delivering sexuality and related health education. School nurse placement, therefore, is a basic prerequisite for protecting students' sex-related health equity.

Limitations and recommendations for future research

This study used the self-report method, so differences may exist between the actual provision of health education programs and how they are perceived by students. By only analyzing the results of KYRBS 2018, this study applied a cross-sectional design; therefore, changes in school nurse placement rates, delivery rates of health education programs, and sexual risk behaviors of adolescents were not determined. In addition, the "sexual risk behaviors" measured in this study only included sexual intercourse with opposite-sex partners. An exploration of other behaviors in more detail, including inconsistent condom use and sexual relationships with multiple partners, is recommended. Namely, we recommend that future studies define "sexual risk behaviors" more broadly as behaviors that pose a risk to normal adolescent development through adverse physical, psychological, and socially negative effects.

Conclusion

This is a secondary-analysis study that analyzed the factors that influence middle school students' sexual risk behaviors by focusing on the school nurse placement level, using statistical data from the 14th Korean Youth Risk Behavior Survey conducted in 2018. The results of this study showed that, among 17 administrative districts, only a half of areas fulfilled the recommendation, which is the middle schools have at least one school nurse per school. Middle school students' sexual risk behaviors are highly related to health risk behaviors such as alcohol and drug use, which are highly influenced by health education experiences; therefore, for the effective prevention of students' sexual risk behaviors, measures to provide equal health education learning opportunities provided by school nurses should be considered in policy-making.

Conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgments

The authors disclose receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIP) [reference number NRF-2017R1A2A2A05001108].

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