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Associations of Health-Risk Behaviors and Health Cognition With Sexual Orientation Among Adolescents in School

Analysis of Pooled Data From Korean Nationwide Survey From 2008 to 2012

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Abstract: Homosexual adolescents may face significant health disparities. We examined health-risk behaviors and health cognition related to homosexual behavior in a representative sample of adolescents.

Data were obtained from 129,900 adolescents between 2008 and 2012 over 5 cycles of the Korean Youth Risk Behavior Survey, a national survey of students in grades 7 to 12. Various health-risk behaviors and aspects of health cognition were compared between homosexual and heterosexual adolescents and analyzed with multiple logistic regression models.

Compared with heterosexual adolescents ($n = 127,594$), homosexual adolescents ($n = 2306$) were more likely to engage in various health-risk behaviors and to have poor health cognition. In multiple logistic regression analysis, not living with parents, alcohol experience (adjusted odds ratio, 1.50; 95% confidence interval, 1.26–1.78 for males and 1.66; 1.33–2.07 for females), smoking experience (1.80; 1.54–2.10 for males and 3.15; 2.61–3.79 for females), and drug experience (3.65; 2.81–4.80 for males and 3.23; 2.35–4.46 for females) were associated with homosexual behavior. Homosexual adolescents were more likely to use adult internet content (2.82; 2.27–3.50 for males and 7.42; 4.19–13.15 for females), and to be depressed (1.21; 1.03–1.43 for males and 1.32; 1.06–1.64 for females). In addition, suicide ideation (1.51; 1.26–1.81 for males and 1.47; 1.16–1.86 for females) and attempts (1.67; 1.37–2.05 for males and 1.65; 1.34–2.03 for females) were significantly more prevalent among homosexual adolescents.

Homosexual adolescents report disparities in various aspects of health-risk behavior and health cognition, including use of multiple substances, adult internet content and inappropriate weight loss methods, suicide ideation and attempts, and depressive mood. These factors should be addressed relevantly to develop specific interventions regarding sexual minorities.

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Abbreviations: AOR = adjusted odds ratio, CI = confidence interval, K-CDC = Korea Centers for Disease Control and Prevention, KYRBS = Korean Youth Risk Behavior Web-based Survey, OR = odds ratio, YRBS = Youth Risk Behavior Surveillance survey.

INTRODUCTION

Homosexuality is a persistent sexual and emotional attraction to or arousal by members of the same sex.¹ Adolescence is a time of physical, emotional, and sexual change,² and sexual orientation emerges before or early in adolescence.^{3–5} Until now, however, data regarding the prevalence of sexual minorities among adolescents have been very limited due to inherent difficulties in gathering accurate data, such as selection bias or limitations of self-report methods. Among 34,706 Minnesota high school students, the reported prevalences of homosexual attraction and sexual behavior were 4.5% and 1%, respectively.⁶ In addition, the proportion of participants reporting same-sex behavior was 1% to 3% in the National Longitudinal Survey of Adolescent Health data.⁷

Although being a person in a sexual minority is not a problem or risk behavior itself, and the majority of sexual minority youth are healthy and well-adjusted, sexual minority adolescents may confront unique health problems, since adolescence is a crucial period and adverse experiences can impair further psychosocial development. For example, stigma and prejudice against sexual minorities in society and feelings of marginalization lead to psychological distress and increase the likelihood of health-risk behavior and poorer health outcomes.^{8–10} From a public health perspective, it is important to develop interventions to support adolescents in this condition. Through these efforts, disparities in health or healthcare for sexual minorities can be reduced. For this purpose, the first step is to evaluate the characteristics and statuses of various health domains in sexual minority youth, such as substance and alcohol use, smoking, abnormal weight, etc.

Very few studies on the issues of sexual minority youth have been carried out in Asian countries, perhaps due to cultural differences in attitudes surrounding sexuality; most of the data have come from the United States, and have pertained primarily to Caucasian people. Considering that Asian culture often is unaccepting of sexual minorities,¹¹ a reliable study in this region is thought to be of high priority for public health.

This study was performed to evaluate the current status of homosexuality and associated factors among Korean adolescents using the results of a nationwide adolescent health evaluation survey.

METHODS

Study Participants

Our data were drawn from the Korean Youth Risk Behavior Web-based Survey (KYRBS) conducted by the Korea Centers for Disease Control and Prevention (K-CDC) and the Ministry of Health and Welfare of Korea. This anonymous online survey is a self-administered questionnaire that has been performed every year since 2005 to assess the health-related behaviors of Korean adolescents in 15 fields, including smoking experience, alcohol use, obesity, diet, physical activity, etc.

All participants for this survey were in schools. To ensure a nationally representative sample of Korean youth, stratified multistage random cluster sampling was applied to this survey, as follows. In the first stage, to minimize sampling error, the sample was stratified according to the city type, school type, degree of geographic accessibility, number of schools and residents, environment, and rate of smoking and drinking. In the next stage, proportional allocation was applied to select 400 middle schools (grades 7–9) and 400 high schools (grades 10–12) according to geography, group, sex, and type of school. In the last stage, 2-stage cluster sampling was applied. After a school was chosen through a systematic sampling method, 1 class from each grade within the school was selected randomly, and all students in the selected class were surveyed. Finally, considering the extraction and response rates and the population composition, weighted values were given to make samples representative of the general adolescent population of the Republic of Korea.

School teachers were trained to assist students participating in the survey. Every September, students completed questionnaires during a regular class hour, using certificate numbers previously assigned by the K-CDC to anonymously access the website. Participants and their parents or legal guardians provided written consent for participation in the survey.

Annually, about 80,000 students (representing about 4,000,000 middle and high school students in Korea) were selected randomly for the KYRBS. From 2008 to 2012, a total of 387,198 students participated and 373,371 students completed the survey, for a response rate of 96.4%. Among them, all the adolescents with no missing data who had ever had sexual contact were analyzed for the present study.

As the present study was based on a national survey which was approved and administered by the K-CDC and the Ministry of Health and Welfare of Korea and used publicly released data from which all personal identifiers were removed by the K-CDC, approval was exempted by the Ethics Committee at our institution.

MEASUREMENTS

Sexual Orientation

Sexual orientation was evaluated using the following questionnaire: Choose all the experiences you have ever had: none of the below, kiss or caress with the other sex, intercourse with the other sex, kiss or caress with the same sex, intercourse with the same sex, being a sexual violence victim, and being a sexual offender. On the basis of their responses, the participants were divided into 3 groups: those who had never had sexual contact with the same or the opposite sex; those who had ever had sexual contact with the opposite sex; and those who had ever had sexual contact with the same sex. We defined the second group as heterosexual and the 3rd group as homosexual.

Participants who experienced both homosexual and heterosexual contact were excluded from analysis.

Social and Environmental Characteristics

Social and environmental characteristics mainly included variables reflecting socioeconomic conditions. Answers regarding city type were divided into rural towns, small- and medium-sized cities, and metropolises; and answers regarding school type were divided into coeducation school, males' school, and females' school. Economic status was assessed subjectively by the participants according to the financial situation of the student's family and was classified into 1 of 5 categories: affluent, intermediate affluent, intermediate, intermediate deprived, and deprived. Students were classified according to their residential type as living with family, living in the house of relatives, living without family and relatives, and living at an orphanage. Whether or not a student lived with a parent of the same sex was measured from 2009 onwards; therefore, the total number of participants who responded to that question was smaller than for other questions. Multicultural families were identified through a question about the parents' country of birth from 2011 onwards. The education level of each parent was classified as middle school graduate or less, high school graduate, college graduate or more, and unknown. Data from participants reporting "unknown" were omitted from the multiple logistic regression analysis. Participants rated their academic performance as very good, good, average, bad, and very bad. Participation in sex education at school during the previous year was assessed with a yes-or-no question.

Substance Use and Other Behavior, Emotional Status, Suicidal Ideation, and Attempts

Substance use and other behavior included experience with alcohol, smoking or drugs, use of adult internet content, and exposure to violence in the past year. Only intentional and repeated use was defined as experience. The use of adult internet content was determined based on use of the 3 most commonly accessed sources of such content. Exposure to violence only included participants who were treated in hospitals.

Emotional status was assessed with questions about happiness, stress, and depressive mood. Happiness perception was graded on a 5-point scale as very happy, somewhat happy, intermediate, somewhat unhappy, or very unhappy. Self-cognition of stress was evaluated on a 3-point scale as a lot of stress, relatively little stress, or almost no stress. Yes-or-no questions were used to assess depressive mood, suicidal ideation, and suicide attempts.

Health-Related Cognition and Behavior

Health-related cognition and behavior included physical activity in the past 7 days, health cognition, body image, and the use of inappropriate weight loss methods in the previous 30 days. Based on the frequency of physical activity, each participant was categorized into 1 of 6 groups: no activity, 1 to 4 times/wk, and more than 5 times/wk. Health cognition was graded on a 5-point scale as very healthy, healthy, intermediate, slightly unhealthy, or unhealthy. Body image was assessed on a 5-point scale as very thin, thin, normal, obese, or very obese. Students also were questioned about their use of unhealthy methods to lose weight, such as vomiting, laxatives, or diuretics.

Statistical Methods

In univariable and multivariable analyses, logistic regression models were used to test the association between homosexuality and related factors in a complex sampling design. A linear trend was tested for variables with ordinal scales. Factors with $P < 0.05$ from univariable analysis were selected and included in multivariable analysis. To reflect national population estimates, sample weights were applied in all analyses. P values and 95% confidence intervals (CIs) for odds ratios (ORs) were corrected by Bonferroni method in case of multiple testing. If Bonferroni method was applied, corrected P value (P/n) and $100(1-0.05/n)\%$ CI were provided. All P -values were 2-sided, and $P < 0.05$ was considered to be statistically significant. SAS version 9.3 (SAS Institute, Cary, NC) was used to perform all analyses.

RESULTS

Among 373,371 students who completed the survey during 5 waves, 129,900 students who experienced sexual behavior were analyzed for the present study.

In general adolescent population of the Republic of Korea ($n = 373,371$), the proportion of participants who had experience in sexual behavior with the same sex was 0.7% (1360/193,375) for males and 0.5% (946/179,996) for females. The mean age (standard deviation) of homosexual adolescents was 15.3 (1.7) years for males and 15.1 (1.8) years for females.

The characteristics of homosexual adolescents were compared with those of heterosexual adolescents for each gender (Table 1). Risk of experiencing homosexual behavior was significantly increased with age in both genders (OR = 1.16 in males [$P < 0.001$] and OR = 1.07 in females [$P < 0.001$]). The proportion of homosexual adolescents was significantly higher among those who lived in the homes of relatives (OR = 7.14 in males [$P < 0.001$] and OR = 4.95 in females [$P < 0.001$]), lived without family and relatives (OR = 1.78 in males [$P < 0.001$] and OR = 2.56 in females [$P < 0.001$]), and lived in orphanages (OR = 9.25 in males [$P < 0.001$] and OR = 20.7 in females [$P < 0.001$]), than among those who lived with their families for both genders. In addition, adolescents who did not live with a parent of the same sex (OR = 6.30 in males [$P < 0.001$] and OR = 3.44 in females [$P < 0.001$]) and those who had multicultural families (OR = 6.49 in males [$P < 0.001$] and OR = 8.08 in females [$P < 0.001$]) had greater odds of homosexual behavior. Academic performance was negatively correlated with homosexual behavior. Adolescents who participated in sex education programs were less likely to have experience in homosexual behavior (OR = 0.61 in males [$P < 0.001$] and OR = 0.65 in females [$P < 0.001$]).

Table 2 shows that homosexual adolescents of both genders were at much greater risk than heterosexual adolescents for drinking alcohol (OR = 2.55 in males [$P < 0.001$] and OR = 3.17 in females [$P < 0.001$]), smoking (OR = 3.16 in males [$P < 0.001$] and OR = 5.78 in females [$P < 0.001$]), and using drugs (OR = 11.6 in males [$P < 0.001$] and OR = 15.6 in females [$P < 0.001$]). The use of adult internet content (OR = 5.35 in males [$P < 0.001$] and OR = 40.5 in females [$P < 0.001$]) and exposure to violence (OR = 6.89 in males [$P < 0.001$] and OR = 18.1 in females [$P < 0.001$]) also was more prevalent in homosexual adolescents than in heterosexual adolescents.

Table 2 also reveals that homosexual adolescents were at greater risk of feeling unhappy and very stressed than heterosexual adolescents. A higher proportion of homosexual

adolescents experienced depressive mood (OR = 2.31 in males [$P < 0.001$] and OR = 2.51 in females [$P < 0.001$]). In addition, homosexual adolescents were more likely to report considering suicide (OR = 2.91 in males [$P < 0.001$] and OR = 3.06 in females [$P < 0.001$]) or attempting suicide (OR = 4.86 in males [$P < 0.001$] and OR = 4.14 in females [$P < 0.001$]) than heterosexual adolescents.

Table 2 displays the results for health-related cognition and behavior. Adolescents with homosexual behavior were significantly more likely to report being unhealthy than heterosexual adolescents. The proportion of participants who used inappropriate methods to lose weight also was higher in homosexual than in heterosexual adolescents (OR = 5.21 in males [$P < 0.001$] and OR = 2.83 in females [$P < 0.001$]). No significant linear trend was found in variables with ordinal scales.

Only variables which were found to be statistically significant among the results from multivariable analysis adjusting for all the factors with $P < 0.05$ from univariable analysis are shown in Table 3. The odds for homosexual behavior were lower in females than in males (adjusted OR = 0.85; 95% CI = 0.73–0.99 [$P = 0.032$]). The use of alcohol, tobacco, drugs, and adult internet content was associated with up to 7-fold higher odds of homosexual behavior. In addition, residential type, depressive mood, suicide ideation or attempts, and use of inappropriate weight loss methods were associated with higher odds of homosexual behavior. However, those who had sex education were less likely to report homosexual behavior (adjusted OR = 0.72 for males and 0.70 for females).

DISCUSSION

The proportion of adolescents with homosexual behavior was <1% for both genders in our study, which was lower than the 2.5% who reported having sex with a member of the same gender in a combined analysis of several Youth Risk Behavior Surveillance surveys (YRBS)¹² and the 1.1% who identified themselves as gay or lesbian in a new robust pooled dataset from the YRBS in the United States.¹³ The lower proportion of sexual minorities in our results may be due to differences in race/ethnicity or culture, since greater stigma and discrimination toward them in traditional Asian culture can make participants hesitant to identify themselves with a sexual minority, even in an anonymous survey.

Although economic status was significantly associated with homosexual behavior by univariable analysis in both genders, a linear trend test did not show a statistical significance, and statistical significance of many variables disappeared after adjustments, especially in females. In these contexts, an association between economic status and homosexual behavior is not clear and needs to be elucidated more. In the present study, household member was significantly associated with homosexual behavior in both genders. This finding indicates that parents or families have important roles related to sexual minority youth issues. Parents play pivotal roles as gatekeepers who may create barriers for their children,¹⁴ and family connectedness and support are important protective factors against health-risk behaviors and adverse health outcomes in sexual minority adolescents.^{15,16} Notably, the proportion of participants from multicultural families was higher in homosexual than in heterosexual youths. Economic status, residential type, or education level of parents might be related, but it should be evaluated more since this variable was not included in multivariable analysis in the present study. Traditionally, the Republic of Korea has been a racially

TABLE 1. Univariable Analysis for Social and Environmental Characteristics Associated With Homosexuality

	Total (n = 129,900)				Males (n = 61,650)				Females (n = 68,250)			
	Hetero (n = 127,594)	Homo (n = 2,306)	OR (95% CI)	P	Hetero (n = 60,290)	Homo (n = 1,360)	OR (95% CI)	P	Hetero (n = 67,304)	Homo (n = 946)	OR (95% CI)	P
Age												
Body mass index*												
Underweight	34,170 (26.8%)	715 (31.0%)	1.13 (1.09–1.17)	<0.001	16,172 (26.8%)	411 (30.2%)	1.16 (1.12–1.21)	<0.001	17,998 (26.7%)	304 (32.1%)	1.07 (1.02–1.13)	0.008
Normal	81,607 (63.9%)	1386 (60.1%)	1 (ref.)	<0.001	37,284 (61.9%)	806 (59.3%)	1 (ref.)	0.007	44,323 (65.9%)	580 (61.3%)	1 (ref.)	0.006
Overweight or obese	11,817 (9.3%)	205 (8.9%)	0.85 (0.69–1.03)	0.122	6834 (11.3%)	143 (10.5%)	0.79 (0.62–1.03)	0.092	4983 (7.4%)	62 (6.6%)	0.82 (0.58–1.17)	0.419
City type												
Rural towns	15,169 (11.9%)	284 (12.3%)	1 (ref.)	0.911	7249 (12.0%)	143 (13.8%)	1 (ref.)	0.423	7920 (11.8%)	96 (10.1%)	1 (ref.)	0.982
Small/medium sized	53,072 (41.6%)	932 (40.4%)	0.94 (0.78–1.11)	0.669	24,496 (40.6%)	529 (38.9%)	0.89 (0.71–1.10)	0.167	28,576 (42.4%)	403 (42.6%)	1.12 (0.82–1.53)	0.833
Metropolis	59,353 (46.5%)	1090 (47.3%)	0.93 (0.78–1.11)		28,545 (47.4%)	643 (47.3%)	0.85 (0.69–1.05)		30,808 (45.8%)	447 (47.3%)	1.10 (0.79–1.53)	
School type												
Cocducation school	84,474 (66.2%)	1561 (67.7%)			40,412 (67.0%)	913 (67.1%)	1 (ref.)	0.839	44,062 (65.5%)	648 (68.5%)	1 (ref.)	0.043
Single-sex school	43,120 (33.8%)	745 (32.3%)			19,878 (33.0%)	447 (32.9%)	1.02 (0.87–1.18)		23,242 (34.5%)	298 (31.5%)	0.83 (0.7–0.99)	
Economic status												
Affluent	8086 (6.3%)	353 (15.3%)	1.06 (0.83–1.36)	1.000	5057 (8.4%)	251 (18.5%)	0.89 (0.66–1.19)	1.000	3029 (4.5%)	102 (10.8%)	1.27 (0.81–1.99)	0.740
Intermediate affluent	30,349 (23.8%)	490 (21.3%)	0.38 (0.30–0.47)	<0.001	15,356 (25.5%)	292 (21.5%)	0.33 (0.25–0.44)	<0.001	14,993 (22.3%)	198 (20.9%)	0.46 (0.32–0.66)	<0.001
Intermediate	59,863 (46.9%)	773 (33.5%)	0.30 (0.25–0.37)	<0.001	26,874 (44.6%)	451 (33.1%)	0.29 (0.23–0.38)	<0.001	32,989 (49.0%)	322 (34.1%)	0.34 (0.24–0.48)	<0.001
Intermediate deprived	22,672 (17.8%)	417 (18.1%)	0.42 (0.33–0.52)	<0.001	9828 (16.3%)	199 (14.6%)	0.33 (0.25–0.44)	<0.001	12,844 (19.1%)	218 (23.0%)	0.59 (0.41–0.84)	0.001
Deprived*	6624 (5.2%)	273 (11.8%)	1 (ref.)		3175 (5.2%)	167 (12.3%)	1 (ref.)		3449 (5.1%)	106 (11.2%)	1 (ref.)	
Residential type*												
With family	122,156 (95.7%)	1995 (86.5%)	1 (ref.)	<0.001	57,612 (95.6%)	1166 (85.7%)	1 (ref.)	<0.001	64,544 (95.9%)	829 (87.6%)	1 (ref.)	<0.001
In house of relatives	1264 (1.0%)	124 (5.4%)	6.48 (5.02–8.37)	<0.001	632 (1.0%)	84 (6.2%)	7.14 (5.21–9.77)	<0.001	632 (0.9%)	40 (4.2%)	4.95 (3.03–8.07)	<0.001
Without family and relatives	3801 (3.0%)	118 (5.1%)	2.11 (1.57–2.82)	<0.001	1817 (3.0%)	68 (5.0%)	1.78 (1.24–2.56)	<0.001	1984 (3.0%)	50 (5.3%)	2.56 (1.61–4.09)	<0.001
At orphanage	373 (0.3%)	69 (3.0%)	13.0 (8.69–19.48)	<0.001	229 (0.4%)	42 (3.1%)	9.25 (5.82–14.71)	<0.001	144 (0.2%)	27 (2.9%)	20.7 (9.97–43.1)	<0.001
Living with parent of same sex [†]												
Yes	126,993 (96.5%)	2240 (98.2%)	1 (ref.)	<0.001	59,987 (99.6%)	1313 (97.6%)	1 (ref.)	<0.001	67,006 (99.7%)	927 (98.9%)	1 (ref.)	<0.001
No	442 (0.3%)	42 (1.8%)	0.17 (0.12–0.25)	<0.001	232 (0.4%)	32 (2.4%)	6.30 (4.34–9.16)	<0.001	210 (0.3%)	10 (1.1%)	3.44 (1.82–6.51)	<0.001
Multicultural family [‡]												
Yes	757 (0.7%)	52 (3.4%)	7.12 (5.17–9.80)	<0.001	382 (0.6%)	32 (3.4%)	6.49 (4.28–9.83)	<0.001	375 (0.7%)	20 (3.5%)	8.08 (4.77–13.7)	<0.001
No	102,551 (99.3%)	1464 (96.6%)	1 (ref.)	<0.001	49,924 (99.2%)	918 (96.6%)	1 (ref.)	<0.001	52,627 (99.3%)	546 (96.5%)	1 (ref.)	<0.001
Education level of father ^{*,§}												
≤Middle school	6504 (5.1%)	187 (8.1%)	1 (ref.)	<0.001	2994 (5.0%)	102 (7.5%)	1 (ref.)	<0.001	3510 (5.2%)	85 (9.0%)	1 (ref.)	<0.001
High school	46,335 (36.3%)	726 (31.5%)	0.53 (0.42–0.66)	<0.001	20,881 (34.6%)	420 (30.9%)	0.57 (0.42–0.76)	<0.001	25,454 (37.8%)	306 (32.3%)	0.49 (0.35–0.69)	<0.001
≥College	57,364 (45.0%)	1049 (45.5%)	0.62 (0.50–0.76)	<0.001	27,677 (45.9%)	633 (46.5%)	0.64 (0.48–0.85)	<0.001	29,687 (44.1%)	416 (44.0%)	0.59 (0.43–0.81)	0.001
Unknown	17,391 (13.6%)	344 (14.9%)			8738 (14.5%)	205 (15.1%)			8653 (12.9%)	139 (14.7%)		
Education level of mother ^{*,§}												
≤Middle school	6346 (5.0%)	185 (8.0%)	1 (ref.)	<0.001	2824 (4.7%)	106 (7.8%)	1 (ref.)	<0.001	3522 (5.2%)	79 (8.3%)	1 (ref.)	<0.001
High school	59,741 (46.8%)	952 (41.3%)	0.53 (0.43–0.67)	<0.001	26,455 (43.9%)	539 (39.6%)	0.52 (0.39–0.69)	<0.001	33,286 (49.5%)	413 (43.7%)	0.56 (0.39–0.79)	<0.001
≥College	44,233 (34.7%)	827 (35.9%)	0.61 (0.49–0.77)	<0.001	21,636 (35.9%)	502 (36.9%)	0.56 (0.42–0.75)	<0.001	22,597 (33.6%)	325 (34.4%)	0.68 (0.49–0.94)	0.015
Unknown	17,274 (13.5%)	342 (14.8%)			9375 (15.5%)	213 (15.7%)			7899 (11.7%)	129 (13.6%)		
Academic performance*												
Very good	13,351 (10.5%)	385 (16.7%)	1.14 (0.91–1.41)	0.572	7114 (11.8%)	252 (18.5%)	1.02 (0.79–1.32)	1.000	6237 (9.3%)	133 (14.1%)	1.28 (0.87–1.89)	0.444
Good	30,292 (23.7%)	399 (17.3%)	0.50 (0.41–0.61)	<0.001	14,200 (23.6%)	219 (16.1%)	0.44 (0.34–0.56)	<0.001	16,092 (23.9%)	180 (19.0%)	0.63 (0.46–0.86)	0.001
Average	34,120 (26.7%)	484 (21.0%)	0.53 (0.44–0.64)	<0.001	15,871 (26.3%)	286 (21.0%)	0.49 (0.39–0.62)	<0.001	18,249 (27.1%)	198 (20.9%)	0.61 (0.45–0.84)	<0.001
Bad	33,263 (26.1%)	584 (25.3%)	0.64 (0.53–0.77)	<0.001	15,131 (25.1%)	318 (23.4%)	0.55 (0.43–0.69)	<0.001	18,132 (26.9%)	266 (28.1%)	0.83 (0.62–1.11)	0.431
Very bad	16,568 (13.0%)	454 (19.7%)	1 (ref.)		7974 (13.2%)	285 (21.0%)	1 (ref.)		8594 (12.8%)	169 (17.9%)	1 (ref.)	
Sex education												
Yes	39,815 (31.2%)	986 (42.8%)	1 (ref.)	<0.001	20,448 (33.9%)	628 (46.2%)	1 (ref.)	<0.001	19,367 (28.8%)	358 (37.8%)	1 (ref.)	<0.001
No	87,779 (68.8%)	1320 (57.2%)	0.61 (0.56–0.68)	<0.001	39,842 (66.1%)	732 (53.8%)	0.61 (0.54–0.69)	<0.001	47,937 (71.2%)	588 (55.2%)	0.65 (0.56–0.77)	<0.001

CI = confidence interval, OR = odds ratio, ref. = reference.

[†]Question about living with a parent of the same sex has been included since 2009.

[‡]Question about multicultural family has been included since 2011.

[§]Responders of “unknown” were excluded from analyses.

* P values and 95% CIs for ORs were corrected by Bonferroni method due to multiple testing.

TABLE 2. Univariable Analysis for Behaviors and Cognitions Associated With Homosexuality

	Total (n = 129,900)						Males (n = 61,650)						Females (n = 68,250)					
	Hetero (n = 127,594)	Homo (n = 2306)	OR (95% CI)	P	Hetero (n = 60,290)	Homo (n = 1360)	OR (95% CI)	P	Hetero (n = 67,304)	Homo (n = 946)	OR (95% CI)	P	Hetero (n = 67,304)	Homo (n = 946)	OR (95% CI)	P		
Alcohol experience	62,276 (48.8%)	561 (24.3%)	1 (ref.)	<0.001	28,104 (46.6%)	348 (25.6%)	1 (ref.)	<0.001	34,172 (50.8%)	213 (22.5%)	1 (ref.)	<0.001	34,172 (50.8%)	213 (22.5%)	1 (ref.)	<0.001		
No	65,318 (51.2%)	1745 (75.7%)	2.84 (2.55–3.18)		32,186 (53.4%)	1012 (74.4%)	2.55 (2.22–2.92)		33,132 (49.2%)	733 (77.5%)	3.17 (2.63–3.84)		33,132 (49.2%)	733 (77.5%)	3.17 (2.63–3.84)			
Yes	94,378 (74.0%)	936 (40.6%)	1 (ref.)	<0.001	39,674 (65.8%)	517 (38.0%)	1 (ref.)	<0.001	54,704 (81.3%)	419 (44.3%)	1 (ref.)	<0.001	54,704 (81.3%)	419 (44.3%)	1 (ref.)	<0.001		
Smoking experience	33,216 (26.0%)	1370 (59.4%)	4.24 (3.85–4.68)		20,616 (34.2%)	843 (62.0%)	3.16 (2.79–3.59)		12,600 (18.7%)	527 (55.7%)	5.78 (4.94–6.76)		12,600 (18.7%)	527 (55.7%)	5.78 (4.94–6.76)			
No	123,978 (98.7%)	1975 (85.6%)	1 (ref.)	<0.001	59,422 (98.6%)	1160 (85.3%)	1 (ref.)	<0.001	66,556 (98.9%)	815 (86.2%)	1 (ref.)	<0.001	66,556 (98.9%)	815 (86.2%)	1 (ref.)	<0.001		
Yes	1616 (1.3%)	331 (14.4%)	13.54 (11.60–15.80)		868 (1.4%)	200 (14.7%)	11.6 (9.83–14.3)		748 (1.1%)	131 (13.8%)	15.6 (11.9–20.4)		748 (1.1%)	131 (13.8%)	15.6 (11.9–20.4)			
Using adult internet content	125,458 (98.3%)	2047 (88.8%)	1 (ref.)	<0.001	58,295 (96.7%)	1154 (84.8%)	1 (ref.)	<0.001	67,163 (99.8%)	893 (94.4%)	1 (ref.)	<0.001	67,163 (99.8%)	893 (94.4%)	1 (ref.)	<0.001		
No	2136 (1.7%)	259 (11.2%)	8.07 (6.79–9.58)		1995 (3.3%)	206 (15.2%)	5.35 (4.47–6.40)		141 (0.2%)	53 (5.6%)	40.5 (25.9–63.2)		141 (0.2%)	53 (5.6%)	40.5 (25.9–63.2)			
Yes	66,141 (97.1%)	705 (79.4%)	1 (ref.)	<0.001	33,499 (95.9%)	429 (77.7%)	1 (ref.)	<0.001	32,642 (98.4%)	276 (82.1%)	1 (ref.)	<0.001	32,642 (98.4%)	276 (82.1%)	1 (ref.)	<0.001		
Exposure to violence	1960 (2.9%)	183 (20.6%)	9.80 (8.08–11.88)		1443 (4.1%)	123 (22.3%)	6.89 (5.49–8.64)		517 (1.6%)	60 (17.9%)	18.1 (12.6–26.1)		517 (1.6%)	60 (17.9%)	18.1 (12.6–26.1)			
No	21,070 (16.5%)	356 (15.4%)	1 (ref.)	1.000	11,860 (19.7%)	249 (18.3%)	1 (ref.)	1.000	9210 (13.7%)	107 (11.3%)	1 (ref.)	1.000	9210 (13.7%)	107 (11.3%)	1 (ref.)	1.000		
Very happy	45,157 (35.4%)	668 (29.0%)	0.98 (0.81–1.19)		22,089 (36.6%)	403 (29.6%)	0.98 (0.78–1.22)		23,068 (34.3%)	265 (28.0%)	1.11 (0.78–1.56)		23,068 (34.3%)	265 (28.0%)	1.11 (0.78–1.56)			
Somewhat happy	39,801 (31.2%)	712 (30.9%)	1.10 (0.91–1.33)		17,356 (28.8%)	422 (31.0%)	1.22 (0.97–1.53)		22,445 (33.3%)	290 (30.7%)	1.12 (0.79–1.60)		22,445 (33.3%)	290 (30.7%)	1.12 (0.79–1.60)			
Intermediate	17,853 (14.0%)	378 (16.4%)	1.25 (0.99–1.57)		7170 (11.9%)	171 (12.6%)	1.13 (0.84–1.52)		10,683 (15.9%)	207 (21.9%)	1.66 (1.15–2.39)		10,683 (15.9%)	207 (21.9%)	1.66 (1.15–2.39)			
Somewhat unhappy	3713 (2.9%)	192 (8.3%)	3.10 (2.35–4.10)		1815 (3.0%)	115 (8.5%)	3.07 (2.18–4.33)		1898 (2.8%)	77 (8.1%)	3.46 (2.17–5.53)		1898 (2.8%)	77 (8.1%)	3.46 (2.17–5.53)			
Very unhappy	62,128 (48.7%)	1310 (56.8%)	1 (ref.)	<0.001	24,558 (40.7%)	688 (50.6%)	1 (ref.)	<0.001	37,570 (55.8%)	622 (65.8%)	1 (ref.)	<0.001	37,570 (55.8%)	622 (65.8%)	1 (ref.)	<0.001		
A lot	47,976 (37.6%)	705 (30.6%)	0.69 (0.61–0.78)		24,588 (40.8%)	475 (34.9%)	0.68 (0.58–0.79)		23,388 (34.8%)	230 (24.3%)	0.59 (0.48–0.72)		23,388 (34.8%)	230 (24.3%)	0.59 (0.48–0.72)			
Relatively little	17,490 (13.7%)	291 (12.6%)	0.80 (0.67–0.96)		11,144 (18.5%)	197 (14.5%)	0.64 (0.51–0.79)		6346 (9.4%)	94 (9.9%)	0.93 (0.69–1.27)		6346 (9.4%)	94 (9.9%)	0.93 (0.69–1.27)			
Almost none	75,669 (59.3%)	902 (39.1%)	1 (ref.)	<0.001	39,389 (65.3%)	605 (44.5%)	1 (ref.)	<0.001	36,280 (53.9%)	297 (31.4%)	1 (ref.)	<0.001	36,280 (53.9%)	297 (31.4%)	1 (ref.)	<0.001		
Depressive mood	51,925 (40.7%)	1404 (60.9%)	2.23 (2.02–2.47)		20,901 (34.7%)	755 (55.5%)	2.31 (2.03–2.63)		31,024 (46.1%)	649 (68.6%)	2.51 (2.14–2.94)		31,024 (46.1%)	649 (68.6%)	2.51 (2.14–2.94)			
No	83,731 (65.6%)	917 (39.8%)	1 (ref.)	<0.001	43,144 (71.6%)	625 (46.0%)	1 (ref.)	<0.001	40,587 (60.3%)	292 (30.9%)	1 (ref.)	<0.001	40,587 (60.3%)	292 (30.9%)	1 (ref.)	<0.001		
Yes	43,863 (34.4%)	1389 (60.2%)	2.75 (2.48–3.04)		17,146 (28.4%)	735 (54.0%)	2.91 (2.56–3.31)		26,717 (39.7%)	654 (69.1%)	3.06 (2.59–3.61)		26,717 (39.7%)	654 (69.1%)	3.06 (2.59–3.61)			
Suicide ideation	117,537 (92.1%)	1697 (73.6%)	4.18 (3.71–4.71)		56,796 (94.2%)	1052 (77.3%)	4.86 (4.17–5.67)		60,741 (90.2%)	645 (68.2%)	4.14 (3.46–4.97)		60,741 (90.2%)	645 (68.2%)	4.14 (3.46–4.97)			
Suicide attempt	10,057 (7.8%)	609 (26.4%)	1 (ref.)	<0.001	3494 (5.8%)	308 (22.7%)	1 (ref.)	<0.001	6563 (9.8%)	301 (31.8%)	1 (ref.)	<0.001	6563 (9.8%)	301 (31.8%)	1 (ref.)	<0.001		
No	32,566 (25.5%)	475 (20.6%)	1 (ref.)	0.903	10,485 (17.4%)	207 (15.2%)	1 (ref.)	0.903	22,081 (32.8%)	268 (28.3%)	1 (ref.)	<0.001	22,081 (32.8%)	268 (28.3%)	1 (ref.)	<0.001		
No activity	28,105 (22.0%)	465 (20.1%)	1.11 (0.91–1.37)		11,905 (19.7%)	267 (19.6%)	1.09 (0.83–1.44)		16,200 (24.1%)	198 (20.9%)	1.01 (0.75–1.37)		16,200 (24.1%)	198 (20.9%)	1.01 (0.75–1.37)			
1 time	26,058 (20.4%)	474 (20.6%)	1.21 (0.99–1.47)		12,885 (21.4%)	289 (21.2%)	1.07 (0.82–1.41)		13,173 (19.6%)	185 (19.6%)	1.16 (0.85–1.56)		13,173 (19.6%)	185 (19.6%)	1.16 (0.85–1.56)			
2 times	18,779 (14.7%)	369 (16.0%)	1.35 (1.09–1.66)		10,390 (17.2%)	236 (17.4%)	1.14 (0.87–1.48)		8389 (12.4%)	133 (14.1%)	1.33 (0.96–1.84)		8389 (12.4%)	133 (14.1%)	1.33 (0.96–1.84)			
3 times	7380 (5.8%)	157 (6.8%)	1.62 (1.22–2.14)		4441 (7.4%)	106 (7.8%)	1.28 (0.92–1.79)		2939 (4.4%)	51 (5.4%)	1.73 (1.07–2.79)		2939 (4.4%)	51 (5.4%)	1.73 (1.07–2.79)			
4 times	14,706 (11.6%)	366 (15.9%)	1.60 (1.28–1.99)		10,184 (16.9%)	255 (18.8%)	1.16 (0.88–1.53)		4522 (6.7%)	111 (11.7%)	1.99 (1.37–2.89)		4522 (6.7%)	111 (11.7%)	1.99 (1.37–2.89)			
≥5 times	22,357 (17.5%)	533 (23.1%)	0.25 (0.16–0.38)		14,085 (23.4%)	383 (28.2%)	0.25 (0.15–0.43)		8272 (12.3%)	150 (15.9%)	0.22 (0.10–0.47)		8272 (12.3%)	150 (15.9%)	0.22 (0.10–0.47)			
Health cognition *	59,701 (46.8%)	883 (38.3%)	0.16 (0.10–0.25)		28,549 (47.3%)	526 (38.7%)	0.18 (0.10–0.30)		31,152 (46.3%)	357 (37.7%)	0.14 (0.07–0.29)		31,152 (46.3%)	357 (37.7%)	0.14 (0.07–0.29)			
Very healthy	34,674 (27.2%)	584 (25.3%)	0.18 (0.11–0.27)		13,684 (22.7%)	313 (23.0%)	0.22 (0.13–0.38)		20,990 (31.2%)	271 (28.7%)	0.15 (0.07–0.30)		20,990 (31.2%)	271 (28.7%)	0.15 (0.07–0.30)			
Healthy	10,260 (8.0%)	257 (11.2%)	0.27 (0.17–0.43)		3666 (6.1%)	109 (8.0%)	0.32 (0.18–0.59)		6594 (9.8%)	148 (15.6%)	0.25 (0.12–0.52)		6594 (9.8%)	148 (15.6%)	0.25 (0.12–0.52)			
Intermediate	602 (0.5%)	49 (2.1%)	1 (ref.)	<0.001	306 (0.5%)	29 (2.1%)	1 (ref.)	<0.001	296 (0.4%)	20 (2.1%)	1 (ref.)	<0.001	296 (0.4%)	20 (2.1%)	1 (ref.)	<0.001		
Slightly unhealthy	6323 (5.0%)	156 (6.8%)	1 (ref.)	0.103	4714 (7.8%)	120 (8.8%)	1 (ref.)	0.103	1609 (2.4%)	36 (3.8%)	1 (ref.)	<0.001	1609 (2.4%)	36 (3.8%)	1 (ref.)	<0.001		
Unhealthy*	26,385 (20.7%)	548 (23.8%)	0.79 (0.60–1.03)		15,525 (25.8%)	377 (27.7%)	0.89 (0.65–1.22)		10,860 (16.1%)	171 (18.1%)	0.63 (0.37–1.06)		10,860 (16.1%)	171 (18.1%)	0.63 (0.37–1.06)			
Body image	41,227 (32.3%)	723 (31.3%)	0.66 (0.51–0.87)		17,787 (29.5%)	432 (31.8%)	0.93 (0.68–1.28)		23,440 (34.8%)	291 (30.8%)	0.45 (0.27–0.75)		23,440 (34.8%)	291 (30.8%)	0.45 (0.27–0.75)			
Very thin																		
Thin																		
Normal																		

	Total (n = 129,900)				Males (n = 61,650)				Females (n = 68,250)			
	Hetero (n = 127,594)	Homo (n = 2306)	OR (95% CI)	P	Hetero (n = 60,290)	Homo (n = 1360)	OR (95% CI)	P	Hetero (n = 67,304)	Homo (n = 946)	OR (95% CI)	P
Obese	45,437 (35.6%)	734 (31.8%)	0.58 (0.45–0.75)	<0.001	18,751 (31.1%)	356 (26.2%)	0.68 (0.50–0.92)	0.006	26,686 (39.7%)	378 (39.90%)	0.51 (0.31–0.84)	0.003
Very obese	8222 (6.4%)	145 (6.3%)	0.74 (0.53–1.03)	0.096	3513 (5.8%)	75 (5.5%)	0.85 (0.56–1.29)	1.000	4709 (7.0%)	70 (7.4%)	0.65 (0.35–1.18)	0.278
Using inappropriate methods to lose weight	123,285 (96.6%)	2058 (89.2%)	1 (ref.)	<0.001	59,067 (98.0%)	1226 (90.2%)	1 (ref.)	<0.001	64,218 (95.4%)	832 (88.0%)	1 (ref.)	<0.001
No	4309 (3.4%)	248 (10.8%)	3.46 (2.96–4.05)		1223 (2.0%)	134 (9.8%)	5.21 (4.23–6.42)		3086 (4.6%)	114 (12.0%)	2.83 (2.25–3.57)	
Yes												

CI = confidence interval, OR = odds ratio, ref. = reference.

*P values and 95% CIs for ORs compared to the reference were corrected by Bonferroni method due to multiple testing.

homogeneous country, but the proportion of multicultural families has been increasing rapidly in recent years, as in many other countries. Since the problems of sexual minority youth can be more profound for racial or ethnic minorities, more attention should be paid to this finding.

The proportions of homosexual participants who had experience drinking alcohol (74.4% in males and 77.5% in females) were similar or higher compared to the rates of 47.5% to 93% in previous studies.^{12,17,18} The prevalence of smoking experience also was greater in homosexual than in heterosexual adolescents (about 3-fold for males and 6-fold for females), in accordance with a study at a university showing that women who had homosexual intercourse were 4.9 times more likely to smoke.¹⁹ Overall, the much greater risk for substance use in homosexual adolescents was consistent with the results of other national surveys and meta-analyses.^{9,20} The use of adult internet content also was associated with homosexual behavior. Until now, internet use had not been investigated in research about sexual minorities. Considering that the internet is an important source of information about sex, like television media,²¹ and that most adolescents can choose to access various sources of adult content easily in the Korean internet environment, this is an interesting but not extraordinary finding. In addition, exposure to violence was strongly correlated with homosexual behavior, in agreement with pooled data from the YRBS survey indicating that sexual minority youth were more likely to be exposed to actual or perceived violence.¹² Since victimization at school is common among sexual minority students^{9,22} and violence is linked to depression and suicidality, supportive school environments that protect students from teasing, bullying, or abuse are important.²³

Homosexual adolescents were at greater risk of feeling unhappy, very stressed, or depressed than heterosexual adolescents in the present study, consistent with several previous studies.^{16,22,24} Stress regarding sexual minority identity is related to stigmatization, resulting in higher levels of health-risk behavior,²⁵ and the prevalence of depression is 1 of the significant health disparities for sexual minority youth.^{12,26}

Suicide risk is an important disparity faced by sexual minorities. The proportion of homosexual adolescents in the present study that had suicide ideation was 54.0% for males and 69.1% for females, and the proportion that had attempted suicide was 22.7% for males and 31.8% for females. A recent review also demonstrated that sexual minority youths were 2 to 7 times more likely than heterosexual youths to attempt suicide,²⁷ and in another meta-analysis, 28% of sexual minority youths had a history of suicidality, compared with 12% of their heterosexual peers.²⁰ Although an increased risk of suicide ideation or attempts among sexual minority youth has been reported consistently,^{28–30} the literature on suicide according to race/ethnicity are limited, and the patterns have been inconsistent across racial/ethnic groups.³¹ Since family connectedness, the care of adults, and school safety are protective against suicidal ideation and attempts,³² these factors should be considered as important components of health services.

In the present study, the risk of using inappropriate methods to lose weight was higher in adolescents with homosexual behavior, consistent with previous studies showing that unhealthy weight-control behaviors were significantly more prevalent among sexual minorities.^{10,33} However, a gender difference was not found in the present study, whereas other studies have reported disparities between the genders.^{33–35} As weight-control issues in adults often begin in adolescence, this issue should be addressed properly during this period.

TABLE 3. Multivariable Analysis of Associated Factors With Homosexuality

	Total		Male		Female	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Age	1.04 (1.00–1.07)	0.070	1.05 (1.01–1.10)	0.028	1.02 (0.96–1.08)	0.533
Economic status*						
Affluent	1.32 (1.03–1.67)	0.102	1.18 (0.88–1.59)	1.000	1.46 (0.96–2.22)	0.322
Intermediate affluent	0.81 (0.65–1.00)	0.210	0.71 (0.54–0.93)	0.052	1.03 (0.73–1.47)	1.000
Intermediate	0.67 (0.55–0.82)	<0.001	0.61 (0.48–0.78)	<0.001	0.80 (0.58–1.10)	0.681
Intermediate deprived	0.74 (0.60–0.91)	0.020	0.55 (0.42–0.72)	<0.001	1.08 (0.78–1.52)	1.000
Deprived	1 (ref.)		1 (ref.)		1 (ref.)	
Residential type*						
With family	1 (ref.)		1 (ref.)		1 (ref.)	
In house of relatives	2.91 (2.23–3.80)	<0.001	3.31 (2.36–4.63)	<0.001	2.08 (1.25–3.46)	0.014
Without family and relatives	1.44 (1.11–1.85)	0.016	1.20 (0.86–1.68)	0.870	1.78 (1.21–2.62)	0.011
At orphanage	2.72 (1.70–4.35)	<0.001	1.93 (1.06–3.51)	0.095	4.01 (1.95–8.25)	<0.001
Academic performance*						
Very good	1.55 (1.27–1.88)	<0.001	1.28 (1.00–1.63)	0.193	2.09 (1.49–2.92)	<0.001
Good	0.97 (0.81–1.16)	1.000	0.76 (0.59–0.97)	0.099	1.44 (1.08–1.91)	0.052
Average	0.94 (0.79–1.12)	1.000	0.81 (0.65–1.00)	0.200	1.25 (0.94–1.65)	0.496
Bad	0.99 (0.84–1.17)	1.000	0.79 (0.64–0.99)	0.168	1.41 (1.08–1.83)	0.043
Very bad	1 (ref.)		1 (ref.)		1 (ref.)	
Sex education	0.70 (0.63–0.78)	<0.001	0.72 (0.63–0.82)	<0.001	0.70 (0.59–0.83)	<0.001
Alcohol experience	1.54 (1.35–1.77)	<0.001	1.50 (1.26–1.78)	<0.001	1.66 (1.33–2.07)	<0.001
Smoking experience	2.25 (2.00–2.54)	<0.001	1.80 (1.54–2.10)	<0.001	3.15 (2.61–3.79)	<0.001
Drug experience	3.71 (3.04–4.53)	<0.001	3.65 (2.81–4.80)	<0.001	3.23 (2.35–4.46)	<0.001
Using adult internet content	3.12 (2.53–3.85)	<0.001	2.82 (2.27–3.50)	<0.001	7.42 (4.19–13.15)	<0.001
Depressive mood	1.25 (1.10–1.43)	<0.001	1.21 (1.03–1.43)	0.022	1.32 (1.06–1.64)	0.012
Suicide ideation	1.49 (1.29–1.73)	<0.001	1.51 (1.26–1.81)	<0.001	1.47 (1.16–1.86)	0.001
Suicide attempt	1.70 (1.47–1.96)	<0.001	1.67 (1.37–2.05)	<0.001	1.65 (1.34–2.03)	<0.001
Physical activity*						
No activity	1 (ref.)		1 (ref.)		1 (ref.)	
1 time	1.13 (0.96–1.34)	0.705	1.21 (0.96–1.53)	0.514	1.02 (0.81–1.29)	1.000
2 times	1.20 (1.02–1.41)	0.129	1.23 (0.98–1.54)	0.386	1.14 (0.89–1.45)	1.000
3 times	1.30 (1.10–1.54)	0.009	1.28 (1.02–1.59)	0.158	1.36 (1.06–1.74)	0.084
4 times	1.46 (1.16–1.85)	0.008	1.41 (1.07–1.85)	0.074	1.52 (1.02–2.28)	0.208
≥ 5 times	1.15 (0.96–1.39)	0.693	1.08 (0.85–1.38)	1.000	1.45 (1.08–1.95)	0.074
Using inappropriate methods to lose weight	1.57 (1.30–1.90)	<0.001	2.10 (1.60–2.77)	<0.001	1.18 (0.90–1.55)	0.244

Adjusted for the following characteristics: age, school type, residential type, academic performance, sex education, perception of health cognition, body image, happiness, stress, depression, suicide ideation, physical activity, suicide attempt, alcohol experience, smoking experience, drug experience, using inappropriate methods to lose weight, and using adult internet content.

CI = confidence interval, OR = odds ratio, ref. = reference.

*P values were corrected by Bonferroni method due to multiple testing.

This study has several strengths. First, these results are based on national, representative, population-based survey from a total of 373,371 participants, with a high response rate of 96.4%. The number of adolescents who had same-sex contact was large (1360 for males and 946 for females). Second, this is the only such nationwide study conducted in an Asian country. Although patterns in health-risk behaviors can differ according to age, race/ethnicity or region, there has been a lack of reliable data from Asian countries, especially in adolescents. In this aspect, the present study could provide useful information for many Asian countries regarding this issue. Moreover, our study addressed various disparities in mental and environmental health such as eating problems, substance use, suicidality, violence, poor body image, poor emotional well-being, etc., while most previous studies have focused on only 1 of these items. Therefore, our results provide a systematic overview of this issue.

However, this study is not without limitations. First, the questionnaire did not include specific questions regarding sexual orientation, since addressing sexual identity was not a goal of the KYRBS. This may have obscured certain dimensions of sexual orientation and variation among sexual minority groups. However, many large health surveys measuring sexual orientation also have used a single item assessing either sexual orientation or the genders of past sexual partners,³⁶ rather than a structured questionnaire to capture the multidimensional constructs of sexual orientation, including attraction, behavior, and identity. Second, this study was cross-sectional, as are most large representative studies, and therefore only associations could be addressed. Ideally, reliable longitudinal studies need to be performed to determine causal relationships, but no large-scale longitudinal studies have been conducted yet. Third, data from the KYRBS were collected from youths in school, while sexual minority youth or those at highest risk for health-risk behaviors are expected to be more likely to drop out of school. Finally, since data across 5 waves were combined, it was not possible to highlight any changes in effect size that might have occurred over the 5 years in which youths were surveyed in this study.

In conclusion, various factors associated with homosexuality were identified, which were similar between males and females. The present study supports previous findings showing that sexual minority youth are at higher risk for health-risk behaviors than heterosexual youth. As a consequence, sexual minority youth could have unique health needs and require comprehensive, culturally effective and special care. Of note, this study provides useful information on this issue, especially in Asian countries. More longitudinal representative data targeting behavioral interventions to reduce risk behaviors are warranted in the future.

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