



# Factors Influencing Suicidal Ideation in Korean Female Adolescents with Sexual Intercourse Experience

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## Abstract

**Background:** Suicide rate in South Korea is the highest among Organization for Economic Cooperation and Development countries. Particularly it is a major public health concern among adolescents. We investigated the factors affecting suicidal ideation among female Korean adolescents who had experienced sexual intercourse.

**Methods:** This study was a secondary data analysis using the 18th Korea Youth Risk Behavior Survey, conducted using a complex sampling design in 2022. A complex sample multiple logistic regression was performed to analyze data of 1,166 female students who had experienced sexual intercourse.

**Results:** Among the general characteristics, significant differences in suicidal ideation depending on grade, household income, living with family, academic achievement, and allergic dermatitis were observed ( $P < 0.05$ ). Additionally, the factors significantly associated with suicidal ideation were contraceptive use, mental health (generalized anxiety disorder, depressive symptoms, loneliness, and stress), current smoking, drinking, insufficient sleep, and insufficient breakfast consumption ( $P < 0.05$ ). Multiple logistic regression analysis revealed that the factors affecting suicidal ideation were generalized anxiety disorder, perceived stress, loneliness, depressive symptom, and smartphone addiction.

**Conclusion:** For female adolescents with sexual experience, negative mental health and smartphone addiction needed to be managed to reduce suicidal ideation.

**Keywords:** Suicidal ideation; Sexual experience; Mental health; Female adolescent

## Introduction

Suicide is a global public health concern, and the suicide rate (25.4 per 100,000 persons) in South Korea is the highest among Organization for Economic Cooperation and Development countries (1). In particular, the incidence rate of suicide between the age of 10 and 19 years has increased continuously from 5.9 per 100,000 in 2019 to 6.5

in 2020 and 7.1 in 2021 (2-4). Based on a recent report on Korean adolescents' mental health, the percentage of adolescents with suicidal ideation was 22.1% for boys, and 62.3% for girls, respectively. In addition, the percentage of adolescents who experienced suicide attempts was 10.2% for boys, and 35.2% for girls, which suggests that the



suicidal ideation and attempt experiences of girls were more than three times higher than those of boys were (5). Sexual experience in adolescence negatively affects mental health, which may cause depression and suicidal ideation (6-8). According to a recent Chinese study, sexual intercourse aged <15 years is more likely to lead to suicide attempts than in those who had sexual experience at the age of  $\geq 18$  years (7). The effect of sexual experience on depression and suicidal ideation in adolescents was more negative in girls than boys was.

Although several studies on sexual experiences have been reported using Korea Youth Risk Behavior Web-based Survey (KYRBWS), which is a nationwide cross-sectional study, reports analyzing the data using an appropriate method for a complex sampling design are limited (9-11).

We aimed to identify factors influencing suicidal ideation among Korean female adolescents with sexual intercourse experiences, by investigating their general characteristics, sexual behaviors, mental health and health risk behaviors.

## Methods

### Study population and data

We used recent data from the KYRBWS conducted from August 2022 to October 2022, which was released in May 2023 (11). The KYRBWS is an anonymous self-report online survey for middle and high school students. This study was approved by the National Statistical Office (approval no. 117058) and has been conducted annually since 2005. As the survey was conducted in computer room at each school, students who were absent were excluded from the sample group. In the 2022 survey, 57,965 students of 800 hundred schools were selected and 51,850 students responded (92.2 % response rate). Among 25,453 female students, the number of the study population was 1,166 (2.2%) excluding 24,287 students without sexual experience (Fig. 1).

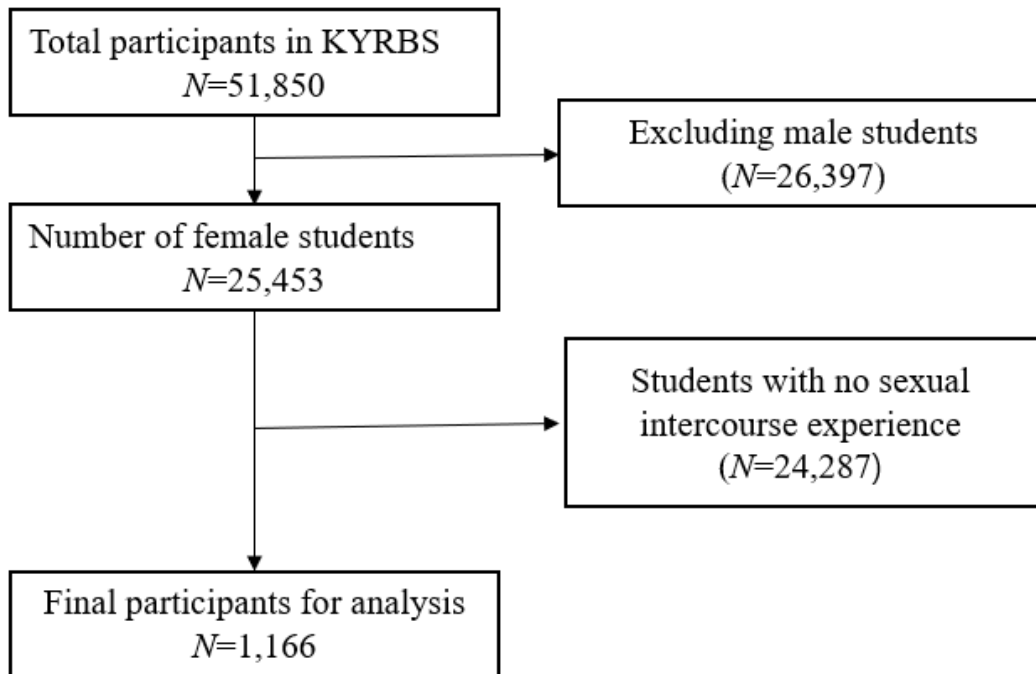


Fig. 1: Flow chart of participant selection

### **General characteristics**

The general characteristics of the study population included grade, household income, living with family, academic achievement, father's educational level, mother's educational level, atopic dermatitis, and allergic rhinitis. In the raw data, responses to household income, and academic achievement were re-categorized from five options (low, low-intermediate, middle, high-intermediate, and high) into three options (low, middle, and high) (12). Father's educational levels and mother's educational levels were categorized into two groups ( $\leq$  high school or  $\geq$  college).

### **Sexual behaviors**

We used three variables contraceptive use, contraceptive method, and sexuality education at school to examine sexual behaviors. For contraceptive use, the question was 'Did you use contraception to prevent pregnancy during sex?'. It was considered that the answer, 'always' is coded as 'contraceptive use' and 'almost', 'sometimes', and 'not at all' were considered 'no contraceptive use'.

### **Mental health**

We used four mental health indicators: generalized anxiety disorder (GAD), depressive symptoms, loneliness, and stress. GAD was examined using seven-item GAD scale (GAD-7) as previously described (12). Each item assessed the symptoms that had disturbed their daily lives in the last 2 weeks. Based on the frequency of symptoms, "not at all", "several days", ">7 days", and "nearly every day" were scored as 0, 1, 2, and 3, respectively. Scores of > 10 were considered indicative of GAD requiring treatment. Depressive symptoms and suicidal ideation were coded as a binomial answer of "yes" or "no" if the individual had symptoms within the last 12 months. Loneliness was indicated "no" for, "not at all", "nearly" and "sometimes" and "yes" for "frequently" and "always". Stress was indicated "no" for "not at all", "a little" and "some" and "yes" for "very much" and "much".

### **Health risk behaviors**

To investigate health risk behaviors, we examined alcohol consumption, current smoking, drug abuse, sleep disorders, regular breakfast consumption, and adequate physical activity. Answers regarding alcohol consumption, smoking, and drug abuse were binary (yes or no). Sleep time was computed as the mean of weekdays and weekends, and was classified into two groups based on 8 h. For regular breakfast intake, the question was 'How many days did you have breakfast?' Answer at 0–4 days were considered irregular, and those at 5–7 days were considered regular. Physical activity was assessed using major statistics released by the KYRBWS. The standard was whether the adolescents exercised to increase their heartbeat or breathing rate for > 60 min/day for 5 days in the last week.

### **Covariates**

Potential factors such as sexual behaviors, mental health, and health risk behaviors influencing suicidal ideation were selected from previous studies (13-15). The covariates included grade (middle school 1, middle school 2, middle school 3, high school 1, high school 2, or high school 3), living with family (yes or no), household income (low, middle, or high), father's and mother's educational level ( $\leq$  high school or  $\geq$  college), academic achievement (low, middle, or high), atopic dermatitis (yes or no), and allergic rhinitis (yes or no). A multiple logistic regression analysis was performed to identify the factors influencing suicidal ideation among female students with sexual experience. In Model 1, sexual behavior, mental health, and health risk behaviors were independent variables, and Model 2 was analyzed by adjusting the covariates to Model 1, as previously described (16).

### **Statistical analysis**

All data were analyzed using IBM SPSS software (version 27.0, Armonk, NY, USA) using a complex sampling method according to the KYRBWS guidelines on raw data use. Differences in suicidal ideation according to the general characteristics, sexual behavior, mental health, and health risk behaviors of the adolescents were analyzed using a

complex sample general linear model and the Rao-Scott chi-square test. Subsequently, multiple logistic regression analyses were performed to estimate the effects of these factors on suicidal ideation. The results are expressed as odds ratios and 95% confidence intervals (CIs) ( $P < 0.05$ ).

## Results

As presented in Table 1, among the general characteristics of female adolescents with sexual experience, suicidal ideation was significantly different depending on grade, household income, living with family, and allergic rhinitis (Table 1).

**Table 1:** General characteristics of study population according to suicidal ideation

Variable	Categories	Total	Suicidal ideation		Rao-Scott $\chi^2$ (p)
		N (%)	No N (%)	Yes N (%)	
Grade	Middle1	60 (4.7)	28 (3.5)	32 (6.5)	2.594 (0.026)
	Middle2	103 (7.7)	60 (7.4)	43 (8.4)	
	Middle3	170 (13.8)	95 (12.4)	75 (16.0)	
	High 1	225 (18.5)	134 (17.4)	91 (20.4)	
	High 2	268 (23.5)	174 (25.1)	94 (20.9)	
	High 3	340 (31.8)	230 (34.3)	110 (27.8)	
Household income	High	419 (37.5)	257 (37.9)	162 (36.9)	3.519 (0.031)
	Middle	483 (41.3)	324 (43.5)	159 (37.7)	
	Low	264 (21.2)	140 (18.6)	124 (25.4)	
Living with family	No	164 (13.5)	80 (11.7)	80 (16.5)	5.629 (0.018)
	Yes	1002 (86.5)	637 (63.2)	365 (36.8)	
Academic achievement	High	357 (30.7)	226 (31.8)	131 (28.7)	2.320 (0.099)
	Middle	279 (24.3)	182 (25.8)	97 (21.8)	
	Low	530 (45.1)	313 (42.4)	217 (49.4)	
Father's educational level	≤High school	267 (30.8)	171 (32.6)	96 (27.7)	1.481 (0.228)
	≥College	451 (56.5)	286 (54.0)	165 (60.6)	
	Missing	115 (12.7)	74 (13.3)	41 (11.7)	
Mother's educational level	≤High school	322 (37.2)	201 (38.2)	121 (35.5)	0.328 (0.719)
	≥College	426 (52.4)	265 (51.3)	161 (54.1)	
	Missing	102 (10.4)	62 (10.5)	40 (10.3)	
Atopic dermatitis	No	858 (72.6)	546 (74.2)	312 (69.8)	1.931(0.165)
	Yes	308 (27.4)	175 (25.8)	133 (30.2)	
Allergic rhinitis	No	716 (60.2)	463 (63.2)	253 (55.3)	5.870(0.016)
	Yes	450 (39.8)	258 (36.8)	192 (44.7)	

Table 2 summarizes the difference in suicidal ideation according to sexual, mental, and health risk behaviors. Among sexual behaviors, a significant difference in suicidal ideation was observed among participants who used contraceptives. Those who did not use contraception had higher suicidal ideation than those who used contraception alone. Regarding mental health, significant

differences in suicidal ideation were observed based on GAD, depressive symptoms, loneliness, and stress ( $P < 0.05$ ). Significant differences in suicidal ideation based on current smoking status, alcohol consumption, insufficient sleep, and inadequate breakfast consumption were also observed (Table 2).

**Table 2:** Sexual behavior, mental health, and health risk behaviors of study population according to suicidal ideation

Variable	Categories	Total	Suicidal ideation		Rao-Scotty <sup>2</sup> (p)
		N (%)	No N (%)	Yes N (%)	
Sexual behaviors					
Contraceptive use	No	642 (53.9)	382 (59.5)	260 (40.5)	636.449 (<0.001)
	Yes	524 (46.1)	339 (64.6)	185 (35.4)	
Contraceptive method	OC	37 (4.4)	24 (4.8)	13 (3.6)	1.296 (0.275)
	Condom	717 (78.9)	456 (80.3)	261 (76.6)	
	Extravaginal ejaculation	119 (13.0)	69 (11.7)	50 (15.1)	
	Etc (Rhythm method, ECP, IUD)	33 (3.8)	19 (3.2)	14 (4.7)	
Received sexuality education at school	No	413 (37.1)	252 (37.7)	161 (36.1)	0.255 (0.614)
	Yes	753 (62.9)	469 (62.3)	284 (63.9)	
Mental health					
GAD	No	721 (61.9)	623 (86.4)	233 (51.2)	120.477 (<0.001)
	Yes	445 (38.1)	98 (13.6)	212 (48.8)	
Depressive Symptoms	No	503 (43.3)	411 (57.0)	92 (21.0)	103.817 (<0.001)
	Yes	663 (56.7)	310 (43.0)	353 (79.0)	
Loneliness	No	702 (60.3)	535 (74.9)	167 (36.4)	140.972 (<0.001)
	Yes	464 (39.7)	186 (25.1)	278 (63.6)	
Stress	No	467 (40.1)	352 (49.5)	115 (24.9)	53.919 (<0.001)
	Yes	699 (59.9)	369 (50.5)	330 (75.1)	
Health risk behaviors					
Current smoking	No	691 (59.7)	465 (64.5)	226 (52.0)	14.963 (<0.001)
	Yes	475 (40.3)	256 (35.5)	219 (48.0)	
Current drinking	No	281 (23.4)	194 (25.9)	87 (19.3)	6.203 (0.013)
	Yes	885 (76.6)	527 (74.1)	358 (80.7)	
Insufficient sleep	No	702 (75.2)	440 (72.1)	262 (80.9)	8.597 (0.004)
	Yes	239 (24.8)	171 (27.9)	68 (19.1)	
Inadequate physical activity	No	134 (11.3)	86 (11.9)	48 (10.5)	0.517 (0.473)
	Yes	1032 (88.7)	635 (88.1)	397 (89.5)	
Insufficient breakfast consumption	No	811 (68.7)	471 (64.3)	340 (75.9)	15.326 (<0.001)
	Yes	354 (31.3)	249 (35.7)	105 (24.1)	
Smartphone addiction	No	169 (15.5)	113 (16.7)	56 (13.4)	2.097 (0.148)
	Yes	594 (84.5)	557 (83.3)	337 (86.6)	

OC, Oral contraceptive; ECP, Emergency contraceptive; IUD, Intrauterine device; GAD, Generalized anxiety disorder

In Model 1, participants with GAD, depressive symptoms, loneliness, and stress demonstrated higher suicidal ideation than those without them; however, smartphone addiction was also significant in Model 2. Individuals with GAD, depressive symptoms, loneliness, stress, and smartphone

addiction demonstrated a 3.24-fold (95% CI: 1.95~5.40), 3.15-fold (95% CI: 1.97~5.02), 2.25-fold (95% CI: 1.44~3.51), 1.64-fold (95% CI: 1.06~2.53) and 1.77-fold (95% CI: 0.96~2.54) increased risk of having suicidal ideation than those without them, respectively (Table 3).

**Table 3:** Logistic regression analysis of suicidal ideation in female students with sexual experience

<i>Variables</i>	<i>Cate- gory</i>	<i>Model 1<sup>a</sup></i>		<i>Model 2<sup>b</sup></i>	
		OR (95% CI)	<i>P-value</i>	OR (95% CI)	<i>P-value</i>
Contraceptive use	Yes	1.092	0.635	1.17 (0.76~1.81)	0.469
Not†		(0.75~1.57)			
Received sexuality education at school	Yes	1.16 (0.80~1.68)	0.414	1.01 (0.65~1.50)	0.983
Not†					
GAD	Yes	2.94 (1.93~4.49)	<0.001	3.24 (1.95~5.40)	<.0001
Not†					
Depressive symptoms	Yes	2.955	<0.001	3.15 (1.97~5.02)	<.0001
Not†		(2.03~4.29)			
Loneliness	Yes	2.57 (1.74~3.79)	<0.001	2.25 (1.44~3.51)	<.0001
Not†					
Stress	Yes	1.71 (1.15~2.54)	0.008	1.64 (1.06~2.53)	0.024
Not†					
Current smoking	Yes	1.26 (0.84~1.89)	0.248	1.27 (0.78~2.05)	0.324
Not†					
Current drinking	Yes	1.21 (0.76~1.93)	0.415	1.48 (0.85~2.56)	0.160
Not†					
Insufficient sleep	Yes	1.24 (0.81~1.88)	0.306	1.61 (0.96~2.69)	0.070
Not†					
Inadequate physical activity	Yes	1.39 (0.78~2.48)	0.257	1.51 (0.69~3.30)	0.302
Not†					
Insufficient breakfast consumption	Yes	1.38 (0.90~2.12)	0.133	1.523	0.097
Not†				(0.926~2.50)	
Smartphone addiction	Yes	1.56 (0.96~2.54)	0.069	1.77 (1.01~3.08)	0.043
Not†					

†Reference group

GAD, Generalized anxiety disorder; OR: odds ratio; CI: confidence interval

Model 1: McFadden 0.232, model 2: McFadden 0.260

<sup>a</sup> Complex sample simple logistic regression analysis was used.

<sup>b</sup> Complex sample multiple logistic regression analysis was used, controlling for covariates

## Discussion

We aimed to investigate factors influencing suicidal ideation, such as general characteristics, sexual behavior, mental health, and health risk behaviors, among female adolescents who have experienced sexual intercourse using recent data from the KYRBWS.

Students who had experience in sexual intercourse are at an increased risk of suicide. One plausible explanation is age norm theory, which is particularly prominent in Korea (17-18). Moreover, the

common factors between sexual behavior and suicidal ideation include self-esteem, stress, anger and family-related factors (19). Since December 2019, the coronavirus disease 2019 (COVID-19) outbreak has spread, and we have experienced a global pandemic. During the pandemic period, students were isolated by social distancing including school closures, and overuse of the internet and social media are factors that could influence mental health, resulting in an increase of the prevalence of depression and anxiety (20). Many cross-sectional studies have analyzed the impact of the

COVID-19 pandemic on adolescents (20-21). Thus, the COVID-19 outbreak and lockdown may have multiple consequences on the lives of adolescents. However, despite social distancing including school closures due to the COVID-19 pandemic, the percentage of individuals with sexual experience according to these serial surveys was 871/54,948 (1.59%) in 2020, 1,048/54,848 (1.91%) in 2021 and 1,166/51,984 (2.24%) in 2022, which indicates an increasing pattern for the last 3 years (9-11). Thus, this meaningful finding requires careful attention, and further studies are needed to confirm the increasing trend of female adolescents having sexual intercourse experiences. Although no significant association between sexuality education in school and suicidal ideation was identified (Table 2), a different method of effective education would be helpful.

In this study, smartphone addiction was the only factor affecting suicidal thoughts among health risk behaviors. Teenagers' smartphone ownership rate is >90%, and unlike male students who aim for entertainment content such as games, female students tend to use relationship-oriented content such as social networking services and instant messages and are more dependent on smartphones than male students (22). Suicidal ideation has been demonstrated to increase as smartphone use increase, and when emotional intelligence is low, suicidal ideation increases; therefore, the amount of time spent using a smartphone is a factor influencing suicidal ideation in adolescents (23-25). In addition, the suicide risk of adolescents who used smartphones for >8 h on weekends was 1.77 times higher than that of those who did not use smartphones, which was consistent with the results of this study. Therefore, developing an intervention strategy is necessary to reduce smartphone dependency among pupils in the lower grades of elementary school because smartphone addiction is more likely to occur owing to a lack of self-control as adolescents are younger.

The present study has several limitations. First, as this is a cross-sectional study, the participants were middle and high school students; therefore, this study could not reflect the results of adolescents

who did not attend school. Second, the answer to the question 'Have you had sexual intercourse?' was used as a measure of sexual experience. Therefore, the analysis was performed regardless of the partner's sex. Finally, since this study is a cross-sectional study, a longitudinal study would be helpful in confirming causal relationship.

## Conclusion

This study provides a comprehensive understanding of suicidal ideation among female middle and high school students with sexual intercourse experience in South Korea. In particular, since the percentage of individuals increased after the COVID-19 outbreak, appropriate psychiatric intervention for female students who have experienced sexual intercourse should be encouraged.

## Journalism ethics considerations

Ethical issues (including plagiarism, informed consent, misconduct, data fabrication, and/or falsification, double publication and/or submission, and redundancy) were observed by the authors.

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## Conflict of Interest

The authors declare that there is no conflict of interest.

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