



# Factors Influencing Suicide Attempts of Adolescents with Suicidal Thoughts in South Korea: Using the 15<sup>th</sup> Korean Youth Risk Behavior Web-Based Survey (KYRBS)

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## Abstract

**Background:** Adolescence is a period of physical and psychological change that causes adolescents to experience anxiety, stress, and loss of control. These experiences can lead to thoughts about suicide. However, not all adolescents with suicidal thoughts attempt suicide. This study aimed to identify the factors that influence suicide attempts among adolescents with suicidal thoughts, and to prepare a theoretical basis for a method to prevent suicide among adolescents.

**Methods:** In this descriptive cross-sectional study, the 15th Korean Youth Risk Behavior Web-Based Survey (2019) was used. The participants were 7,498 adolescents aged 12-18 yr with thoughts of suicide. Factors influencing suicide attempts among adolescents with suicidal thoughts were analyzed using a complex sample logistic analysis.

**Results:** Gender, age, academic performance, and economic level were the general factors associated with suicide attempts of adolescents with suicidal thoughts. Physical and psychological factors included smoking, alcohol use, drug use, sex-related experience, experiencing violence, efforts to reduce weight, level of physical activity, and depression.

**Conclusion:** Age and gender should be taken into consideration when designing suicide prevention activities. In addition, in order to lower the suicide rate of adolescents in Korea, an effective system of prevention and intervention strategies should be implemented, which attend to the issues of adolescents from low-income families, adolescent weight and body image concerns, and adolescent depression.

**Keywords:** Adolescent; Big data; Depression; Suicidal; Suicide attempt

## Introduction

Suicide is a self-directed act with the intention of dying, and the result is death (1). Intentional self-harm, or suicidal behavior, is one of the leading

causes of death among adolescents. In 2019, suicide was the number one cause of death among adolescents aged 10-19 in South Korea (2). Ado-



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Adolescence is a period of change, and it is the period of establishing identity, building self-esteem, and establishing new relationships (3). Adolescents who perform these various new and difficult tasks experience anxiety, stress, and a loss of control (4). Suicide is caused by a variety of factors, but because genetic and biological factors work in combination with psychological and social factors, these situations that occur during the period of adolescence can act as risk factors (5).

Factors that influence suicide have a greater impact on adolescents than adults (6). Among them, an important risk factor for suicide attempts is suicidal thoughts (7). Suicidal thoughts involve thinking, considering, and planning suicide (8). Moreover, adolescence is a very important period in this regard, as suicidal thoughts and suicide attempts that appear in adolescence can reappear in adulthood (9). Those who make a suicide attempt harm themselves with the intention of dying, but such attempts may be relatively harmless or non-serious (10). Therefore, the relationship between suicidal thoughts and suicidal behavior in adolescents is an important area of research investigation, especially given the strong link between suicide attempts and death by suicide (11). Approximately 30% of adolescents with suicidal thoughts actually attempted suicide (12). In Korea, over a period of 12 months, 12.2% of adolescents seriously considered suicide and 2.4% actually attempted suicide (13). Another study of Korean adolescents reported that 8.3% of adolescents had seriously considered suicide and 3.2% had attempted suicide in the past 12 months (9). However, suicide attempts occur approximately 10-20 times more frequently than actual suicide (3).

Antecedents for adolescent suicide attempts revealed through previous studies include gender, aggression, impulsivity, self-harm, mental illness, and drug use (14, 15). Risk factors for adolescent suicide also include psychological factors such as depression, influence of friends and school, family relationship problems, stress, alcohol and drug use, personal characteristics, and mental disorders (5, 16–19). It is necessary to identify psychological problems such as depression or stress among

adolescents contemplating suicide, especially as 90% of those who commit suicide are reported to have at least one mental disorder (6).

Not all adolescents with suicidal thoughts attempt suicide. Nevertheless, because suicide attempts are a crucial problem that can result in death, efforts are needed to prevent suicide attempts in adolescents with suicidal thoughts. However, there are no previous studies that specifically identified factors affecting suicide attempts among adolescents with suicidal thoughts. Therefore, we aimed to identify the difference between adolescents attempted suicide while having suicidal thoughts and adolescents who did not attempt suicide using large-scale data on Korean adolescents.

## **Materials and Methods**

### *Study design and participants*

In this study, a secondary data analysis was carried out on the 15th (2019) Korean Youth Risk Behavior Web-Based Survey (KYRBS). The study is descriptive and aims to identify the factors related to suicide attempts among adolescents with suicidal thoughts. The KYRBS is a government-approved statistical survey to aid the understanding of the health behavior of Korean adolescents (No. 117058).

This study was conducted on the website of the Korea Centers for Disease Control and Prevention after receiving approval for the use of raw data from the KYRBS. Among the 57,303 youth aged 12-18 yr who participated in the 15th KYRBS, 7,498 participants were included in this study. Among them, 1,538 (20.51%) had attempted suicide.

### *Study variables*

Study variables were selected based on previous studies, and the selected variables were classified into general, physical, and psychological factors based on literature reviews on risk factors for suicide (20). The general factors were gender, age, academic performance, economic level, type of residence, number of breakfasts per week, and

hours of smartphone use on weekdays and weekends. Age was divided into 12-15 and 16-18 yr old, and academic performance and economic level were divided into high, medium, and low. Type of residence was categorized as living with family members or living with others, and the number of breakfasts per week was divided into 0, 1-3 d, and 4 or more d.

Physical factors included use of alcohol, smoking, habitual or deliberate drug use, sexual experience, experience of being treated for violence in the last 12 months, degree of fatigue recovery from sleep for the last 7 d, body mass index (BMI), efforts for weight control, and number of days per week of physical activity for more than 60 min a day for the last 7 days. The degree of fatigue recovery from sleep for the last 7 days was classified into sufficient and insufficient. BMI was categorized as less than 18.5 kg/m<sup>2</sup>, 18.5–24.9 kg/m<sup>2</sup>, and 25 kg/m<sup>2</sup> or more. Weight control effort was categorized as efforts to reduce, increase, maintain, or no effort. The number of physical activity days was divided into 0 d, 1–3 d, and 4 or more days.

Psychological factors included experiencing stress and the presence of depression within two weeks.

The responses for stress were feeling a lot, feeling a little, or not at all.

### Statistical analysis

Using the SPSS 25.0 (IBM Corp., Armonk, NY, USA), a composite sample planning file was created by assigning weights suggested by the Korea Centers for Disease Control and Prevention, and analyzed as a composite sample, and the significance level was set to .05. The degree of general, physical, and psychological factors was measured using mistakes and weighted percentages. For comparison between groups, a composite sample crossover analysis or *t*-test was used. Complex sample logistic analysis was used to identify factors related to suicide attempts.

## Results

### Comparison of general factors according to suicide attempt

There was a difference in whether or not adolescents attempted suicide according to gender, age, academic performance, economic level, type of residence, number of breakfasts per week, and the number of times of smartphone use on weekdays and weekends (Table 1).

**Table 1:** Comparison of general characteristics according to suicide attempt

Characteristics		No suicide attempt (n=5960) n (weight %)/ mean (SE)	Suicide attempt (n=1538) n (weight %)/ mean (SE)	$\chi^2$ or t (P)
Gender	Male	2237 (38.0)	494 (33.9)	8.79 (.009)
	Female	3723 (62.0)	1044 (66.1)	
Age (year)	12-15	3188 (55.6)	890 (63.0)	24.47 (<.001)
	16-18	2301 (44.4)	466 (37.0)	
Academic performance	High	2026 (33.9)	460 (30.2)	30.72 (<.001)
	Medium	1659 (28.3)	380 (24.1)	
	Low	2275 (37.9)	698 (45.7)	
Economic level	High	2030 (34.4)	509 (34.4)	45.60 (<.001)
	Medium	2717 (45.7)	593 (38.1)	
	Low	1213 (19.9)	436 (27.4)	
Residence type	With family	5599 (94.6)	1385 (90.4)	33.93 (<.001)
	Others	361 (5.4)	153 (9.6)	
Frequency of breakfast (week)	0	1340 (21.8)	411 (26.8)	28.49 (<.001)
	1-3	1609 (26.9)	452 (29.1)	
	≥4	3011 (51.4)	675 (44.1)	
Weekday smartphone usage time(minute/day)		169.27 (2.21)	194.66 (4.91)	-4.63 (<.001)
Weekend smartphone usage time(minute/day)		269.68 (3.08)	303.61 (6.10)	-5.01 (<.001)

SE: Standard Error

**Comparison of physical and psychological factors according to suicide attempt**

Regarding physical factors, there was a difference between attempters and non-attempters according to smoking, alcohol use, experience of drug use, sexual experience, experience of being treated for violence in the last 12 months, weight control effort, and the number of days of physical activity per week for more than 60 min a day for

the last seven days. There were higher rates of suicide attempts among adolescents who smoked, drank alcohol, experienced using drugs, had sexual experience, received treatment for violence, or engaged in more physical activity.

There were significant differences in psychological characteristics according to depression and stress. Adolescents who were depressed or stressed had more suicide attempts (Table 2).

**Table 2:** Comparison of physical and psychological characteristics according to suicide attempt

<i>Factor</i>	<i>Characteristics</i>		<i>No suicide attempt (n=5960) n (weight %)</i>	<i>Suicide attempt (n=1538) n (weight %)</i>	<i>χ<sup>2</sup> (P)</i>
Physical factor	Smoking	Yes	1035 (17.6)	470 (31.3)	129.13 (<.001)
		No	4925 (82.4)	1068 (68.7)	
	Alcohol drinking	Yes	2994 (50.4)	946 (62.0)	66.05 (<.001)
		No	2966 (49.6)	592 (38.0)	
	Drug experience	Yes	127 (2.1)	165 (11.5)	211.76 (<.001)
		No	5833 (97.9)	1373 (88.5)	
	Sexual experience	Yes	502 (8.5)	288 (19.5)	134.13 (<.001)
		No	5458 (91.5)	1250 (80.5)	
	Violent treatment experience	Yes	274 (4.6)	234 (16.3)	211.15 (<.001)
		No	5686 (95.4)	1304 (83.7)	
	Restoring fatigue by sleeping	Sufficient	646 (10.4)	176 (11.1)	0.49 (.529)
		Insufficient	5314 (89.6)	1362 (88.9)	
	Body Mass Index (kg/m <sup>2</sup> )	<18.5	1170 (20.2)	267 (19.0)	1.32 (.560)
		18-24.9	3571 (63.5)	855 (63.8)	
≥25		915 (16.3)	223 (17.2)		
Weight control effort	Reduction efforts	2456 (40.5)	698 (45.5)	23.09 (<.001)	
	Increasing effort	401 (6.6)	99 (6.2)		
	Maintenance effort	671 (11.3)	191 (13.0)		
	No effort	2432 (41.6)	550 (35.2)		
Physical activity (days/week)	0	2229 (37.5)	535 (35.2)	26.17 (<.001)	
	1-3	2583 (43.6)	615 (39.9)		
	4-7	1139 (18.9)	388 (24.9)		
Psychological factor	Depression	Yes	4192 (70.3)	1276 (83.1)	107.42 (<.001)
		No	1768 (29.7)	262 (16.9)	
	Stress	A lot	4654 (77.8)	1256 (81.3)	8.73 (.007)
		A little or not at all	1306 (22.2)	282 (18.7)	
	Body image	Thin	1379 (23.0)	334 (22.0)	5.36 (.103)
		Moderate	1906 (32.2)	473 (29.9)	
Obese		2675 (44.8)	731 (48.1)		

### Factors related to suicidal attempts of adolescents with suicidal thoughts

In order to determine the factors related to suicide attempts in adolescents with suicidal thoughts, logistic analysis was performed. With regard to general factors, gender, age, academic performance, and economic level had an effect

on adolescent suicide attempts. Regarding physical factors, smoking, alcohol use, drug use, sexual relationship experience, weight control effort, and physical activity were found to be the influencing factors of suicide attempts. Regarding psychological factors, depression was a factor influencing suicide attempts (Table 3).

**Table 3:** Factors related to suicidal attempts of adolescents with suicidal thought (N=7,498)

Factor	Characteristics		OR	95% CI	P
General factor	Gender (ref: female)	Male	0.736	0.601-0.902	.003
	Age (ref: 16-18 years)	12-15	1.638	1.359-1.976	<.001
	Academic performance (ref: medium)	High	1.023	0.816-1.283	.842
		Low	1.239	1.010-1.519	.040
	Economic level (ref: medium)	High	1.076	0.894-1.295	.436
		Low	1.244	1.014-1.527	.037
	Residence type (ref: with family)	Others	1.229	0.860-1.756	.258
	Frequency of breakfast(/week) (ref: 0)	1-3	0.996	0.798-1.242	.367
		≥4	0.908	0.735-1.121	.376
	Weekday smartphone usage time (minute/day)		1.0	0.999-1.001	.769
Weekend smartphone usage time (minute/day)		1.0	1.0-1.001	.522	
Physical factor	Smoking (ref: no)	Yes	1.383	1.120-1.707	.003
	Alcohol drinking (ref: no)	Yes	1.305	1.076-1.582	.007
	Drug experience (ref: no)	Yes	3.842	2.517-5.863	<.001
	Sexual experience (ref: no)	Yes	1.599	1.205-2.123	.001
	Violent treatment experience (ref: no)	Yes	3.341	2.394-4.662	<.001
	Weight control effort (ref: no effort)	Reduction efforts	1.216	1.015-1.457	.034
		Increasing effort	0.764	0.520-1.122	.170
		Maintenance effort	1.227	0.917-1.643	.169
	Physical activity(days/week) (ref: 0)	1-3	0.968	0.801-1.171	.740
		4-7	1.281	1.003-1.634	.047
Psychological factor	Depression (ref: no)	Yes	2.0	1.588-2.518	<.001
	Stress (ref: a little & none)	Much	1.170	0.936-1.462	.167

## Discussion

This study was conducted to identify the factors influencing suicide attempts among Korean adolescents with suicidal thoughts using data from the 15th KYRBS. In this study, older adolescent girls had a higher rate of suicidal thoughts, leading to a greater number of suicide attempts than adolescent boys. Additionally, this is consistent with a study on Iranian adolescents, which

showed that female students were more likely to commit suicide (21). Furthermore, suicide attempts in adolescent girls were twice as high as that in boys, related to the less-lethal methods used by girls (5). Although male adolescents have a lower rate of suicide attempts, they have a higher suicide rate because they use more lethal methods. However, there is no data to support whether adolescents who attempted suicide succeeded in it. Therefore, we believe that cohort studies should be conducted to continuously fol-



low-up adolescents with suicidal thoughts, the content of those thoughts, and how thoughts relate to attempts.

In this study, younger adolescents were found to have more suicide attempts. Younger adolescents experience more unstable emotions or sudden physical changes than older adolescents (22). Because of this, younger adolescents are more likely to consider suicide. In addition, low academic performance was found to be a factor influencing suicide attempts. In relation to previous findings, that school maladjustment increases the risk of suicide among adolescents (5), lower levels of academic achievement may be considered related to a lack of adaptability to school life and work. Therefore, when designing a suicide prevention program for adolescents with suicidal thoughts, it is necessary to reflect the factors for improving school adaptability.

Among the physical factors, the influencing factors of suicide attempts were smoking, alcohol use, drug use, sexual experience, experience of violence, and more frequent physical activity. These results are consistent with previous research showing that smoking, alcohol use, drug use, and sexual and violent experiences increased the risk of suicide (5, 9). Additionally, this is consistent with previous studies in southern Iran, which found that the primary cause of suicide was family conflict and drug use was a dominant method of suicide among teenagers (23). This finding can be considered in reference to the finding in the present study, namely, more suicide attempts were made by adolescents of low economic status. Children who grow up in low economic environments tend to receive less parental attention, and insufficient parental attention can lead to inappropriate behavior in adolescence. In this process, the child may encounter various negative experiences, which are thought to affect adolescents in various ways in terms of suicide (9, 24). The delinquency behavior of poor youth has been a problem for a long time, and many remedial measures have been suggested to address this problem. However, delinquency behavior according to the living environment of adolescents continues, which leads to adolescents'

suicide. Therefore, it is necessary to develop an effective support program that considers the living environment of adolescents.

Efforts to reduce weight was also found to be an influencing factor for adolescent suicide attempts, considered in relation to cultural values that emphasize physical appearance. Adolescence is a time when there are important body changes, and adolescents have an increased focus on their body and appearance. In recent years, adolescent girls have focused on being thin because of the social trend that values slimness (25). Therefore, even if they have a normal weight or BMI, they try to lose weight, and despite these efforts, they become frustrated if they do not think they are slim enough. In a large-scale survey conducted in Korea, adolescents' body image was related to suicidal thoughts; in particular, those who perceived their body as fat or as thin were more likely to have suicidal thoughts (26). Given the importance of weight and body image concerns of adolescents and their potential to induce thoughts of suicide, it is necessary to address adolescents' feelings and perceptions about their bodies.

In this study, adolescents who were physically active four to seven times a week had more suicide attempts. This is inconsistent with a study (22) that found higher levels of physical activity were associated with lower rates of suicidal thoughts and attempts. Physical activity is generally known to have a positive effect on mental health through anxiety, depression, and stress relief (22). However, in a study of 136,857, 12-15-year-old adolescents from 48 countries, high levels of physical activity were found to be associated with a lower risk of suicide attempts in boys and an increased risk of suicide attempts in girls (27). This can be due to girls' body image concerns, whereby body image dissatisfaction or low self-esteem results in efforts to lose weight through increased physical activity and exercise (28). It can also be thought of in relation to stress, and girls are more likely to over-exercise as an active coping strategy when stress is high (29). Therefore, girls stressed and have a negative body image may be more likely to be physically active,

perhaps to an excessive degree. These are all risk factors for suicide. However, being physically active can improve physical and mental health. Therefore, active involvement of school staff and the community is required, so that youth can habituate regular and moderate physical activity. Among the psychological factors, only depression was found to be a factor affecting suicide attempts. Depression is a risk factor for adolescent suicide (9, 30). Depression has been related to several other factors that were identified in this study. For example, studies have shown a relationship between depression and drug use, sexual experience, experience of violence (31–33), and poverty (34). In addition, an association with depression was recently found in relation to weight (35). Depression is influenced by many factors and is associated with various negative outcomes. Therefore, it is necessary to manage depression, which is a powerful factor influencing suicidal attempts, and develop interventions that consider risk factors for adolescent depression.

This study has several limitations. First, because suicide attempt was measured with a single question, the extremity of the suicide attempt is unknown. Second, this study was conducted as a cross-sectional study, which limits the ability to make causal inferences on the relationships found between the factors and attempting suicide. Therefore, a longitudinal follow-up study that tracks adolescents with suicidal thoughts is necessary. Nevertheless, this study is meaningful in that it explored the influencing factors that lead to suicide attempts targeting adolescents with suicidal thoughts. In addition, efforts at weight control was a new factor identified as influencing suicide attempts among adolescents with suicidal thoughts.

## Conclusion

This study was conducted using the 15th KYRBS in Korea to identify the factors that influence suicide attempts among adolescents with suicidal thoughts. The general factors affecting suicide attempts of adolescents with suicidal thoughts were gender, age, academic performance, and

economic level. The physical and psychological factors included smoking, alcohol use, drug use, sex-related experience, experiencing violence, level of physical activity, and depression. Based on this results, in order to lower the suicide rate of youth in Korea, an effective system of prevention and intervention strategies should be implemented, which attend to the issues of adolescents from low-income families, adolescent weight and body image concerns, and adolescent depression.

## Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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## Conflict of interest

The authors declare that there is no conflict of interests.

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